LIBRARY OF CONGRESS
RECEIVED
SEP 1 1903
PERIODICAL

Librarian of Congress
Copyright Office
18 Jul 1904-d
Washington D C

THE IRON AGE

A Review of the Hardware, Iron, Machinery and [illegible] Trades.

Published every Thursday Morning by David Williams Co., 232-238 William St., New York.

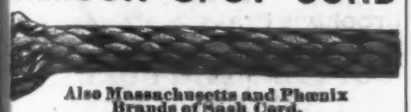
Vol. 72: No. 11. *New York, Thursday, September 10, 1903.* $5.00 a Year, including Postage. Single Copies, 15 Cents.

Reading Matter Contents.....page 54
Alphabetical Index to Advertisers " 173
Classified List of Advertisers.... " 165
Advertising and Subscription Rates " 172

IRON AND STEEL
REPUBLIC IRON & STEEL COMPANY
CHICAGO, ILL.
PRODUCTS

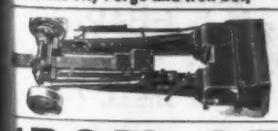
Bristol's Patent Steel Belt Lacing.

SAVES
Time, Belts, Money.
Greatest Strength with Least Metal
Send for Circulars and Free Samples.
THE BRISTOL CO., Waterbury, Conn.

SAMSON SPOT CORD

Also Massachusetts and Phœnix Brands of Sash Cord.
SAMSON CORDAGE WORKS, Boston, Mass.

TURNBUCKLES.

Branch Office, 11 Broadway, New York.
Cleveland City Forge and Iron Co., - Cleveland, O.


MERRILL BROS., 465 Kent Ave, BROOKLYN, N. Y.

IRON ORES.
PILLING & CRANE, Girard Building, Phila. Farmers' Bank, Pittsburg Empire Bldg., New York Board of Trade, Boston.

NOT INFALLIBLE

So, if you please, return any sheet of Apollo in which you find the least fault.

It is human to make mistakes; we expect them; but we are responsible for them; don't cover them up.

Quick service.

Return a whole sheet for an inch of fault.

American Sheet Steel Company
Battery Park New York

Remington
HAMMERLESS SHOT GUN
FOR $25.00.

Guaranteed for Nitro Powders.

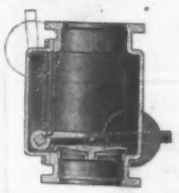
Grade K Made with Remington Blued Steel Barrels.....$25.00.
Grade K E D. Made with Damascus Barrels and Automatic Ejector.....$35.00.
Send for handsome new Catalog, just issued, containing complete description of Guns, $25.00 to $750.00. Mailed free.

REMINGTON ARMS CO.,
ILION, N. Y.
313-317 Broadway, New York. 86-88 First Street, San Francisco, Cal.
Sold by all Gun Dealers. Not Retailed by the Manufacturers.

CAHALL BOILERS See Page 124.

REGULAR PATTERN.
PLATE PATTERN.
CORRUGATED PATTERN.
CAPEWELL HORSE NAILS
Branches:
NEW YORK, PHILADELPHIA, CHICAGO, ST. LOUIS, BOSTON, DETROIT, CINCINNATI, SAN FRANCISCO, PORTLAND, ORE., BUFFALO, BALTIMORE, NEW ORLEANS, DENVER.
THE CAPEWELL HORSE NAIL COMPANY
HARTFORD, CONN.

REGULAR PATTERN.


Excelsior Straightway Back Pressure Valve
is simple in construction and well made. Being fitted with the Jenkins Disc, it is noiseless and never sticks. Gives long service, and can be relied upon at all times. Can be quickly thrown in and out of use without taking valve apart. It offers no resistance to the steam when wide open.
JENKINS BROS., New York Boston, Philadelphia, Chicago, London.

"Swedoh" Cold Rolled Steel is unexcelled for Drawing and Stamping
THE AMERICAN TUBE & STAMPING COMPANY
(Water and Rail Delivery) BRIDGEPORT, CONN.
SEE PAGE 28.

MAGNOLIA METAL.
Best Anti-Friction Metal for all Machinery Bearings.
Fac-Simile of Bar. Beware of Imitations.

MAGNOLIA METAL CO.,
Owners and Sole Manufacturers, 511-513 West 13th St., NEW YORK.
Chicago, Fisher Bldg. San Francisco, New Orleans, Montreal, Boston, Pittsburg and Philadelphia. We manufacture all grades of Babbitt Metals at competitive prices

THE
ANSONIA BRASS AND COPPER CO.
MANUFACTURERS OF
BRASS AND COPPER
Seamless Tubes, Sheets, Rods and Wire.

SOLE MANUFACTURERS
Tobin Bronze
(TRADE-MARK REGISTERED.)
Condenser Plates, Pump Linings, Round, Square and Hexagon Bars, for Pump Piston Rods and Bolt Forgings. Seamless Tubes for Boilers and Condensers.
99 John Street, - - New York.

Randolph-Clowes Co.,
Main Office and Mill,
WATERBURY, CONN.
MANUFACTURERS OF
SHEET BRASS & COPPER.
BRAZED BRASS & COPPER TUBES.
SEAMLESS BRASS & COPPER TUBES
TO 36 IN. DIAM.
New York Office, 253 Broadway, Postal Telegraph Bldg., Room 715.
Chicago Office, 602 Fisher Bldg.

BRASS { SHEET ROD WIRE
COPPER { SHEET ROD WIRE
GERMAN SILVER { SHEET ROD WIRE
LOW BRASS. SHEET BRONZE. SEAMLESS BRASS AND COPPER TUBING. BRAZED BRASS AND BRONZE TUBING. : : : : : : : :

WATERBURY BRASS CO.,
WATERBURY, CONN.
130 Centre St., New York. Providence, R. I.

BRIDGEPORT DEOXIDIZED BRONZE AND METAL COMPANY,
BRIDGEPORT, CONN.
Largest Jobbing Brass Foundry in New England.
LARGE CASTINGS A SPECIALTY.
Bronze, Brass, Aluminum and Babbitt Metals.
No order too large for us to handle. None too small to receive our careful attention.

THE PLUME & ATWOOD MFG. CO.,
MANUFACTURERS OF
Sheet and Roll Brass
—AND—
WIRE
PRINTERS' BRASS, JEWELERS' METAL, GERMAN SILVER AND GILDING METAL, COPPER RIVETS AND BURRS.
Pins, Brass Butt Hinges, Jack Chain, Kerosene Burners, Lamps, Lamp Trimmings, &c.
39 MURRAY ST., NEW YORK.
144 HIGH ST., BOSTON.
199 LAKE ST., CHICAGO.
ROLLING MILL: THOMASTON, CONN. | FACTORIES: WATERBURY, CONN.

SCOVILL MFG. CO.,
Manufacturers of
BRASS, GERMAN SILVER
Sheets, Rolls, Wire
Rods, Bolts and Tubes,
Brass Shells, Cups, Hinges,
Buttons, Lamp Goods.
SPECIAL BRASS GOODS TO ORDER
Factories, WATERBURY, CONN.
DEPOTS:
NEW YORK, CHICAGO, BOSTON.

JOHN DAVOL & SONS,
AGENTS FOR
Brooklyn Brass & Copper Co.
DEALERS IN
COPPER, TIN, SPELTER, LEAD, ANTIMONY.
100 John Street, - New York.

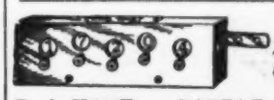
Matthiessen & Hegeler Zinc Co.,
LA SALLE, ILLINOIS.
SMELTERS OF SPELTER
AND MANUFACTURERS OF
SHEET ZINC AND SULPHURIC ACID.
Special Sizes of Zinc cut to order. Rolled Battery Plates.
Selected Plates for Etchers' and Lithographers' use.
Selected Sheets for Paper and Card Makers' use.
Stove and Washboard Blanks.
ZINCS FOR LECLANCHE BATTERY.

Arthur T. Rutter
SUCCESSOR TO
WILLIAM S. FEARING
256 Broadway, NEW YORK
Small tubing in Brass, Copper, Steel, Aluminum, German Silver, &c. Sheet Brass, Copper and German Silver. Copper, Brass and German Silver Wire. Brazed and Seamless Brass and Copper Tube. Copper and Brass Rod.

BRASS FOUNDERS FINISHERS J. J. RYAN & CO.
68-74 West Monroe St., Chicago.
Best Bronze, Babbitt Metals, Brass and Aluminum CASTINGS On Short Notice.

BRASS, BRONZE and ALUMINUM CASTINGS.
Founders, Finishers.
W. G. ROWELL & CO., BRIDGEPORT, CONN

"Search-Light"
OIL and GAS
Bicycle Lanterns.
Send for Circulars and Electrotypes.
THE BRIDGEPORT BRASS CO.
Bridgeport, Conn.
19 Murray St., N. Y. 17 No. 7th St., Philadelphia.
85 to 87 Pearl St., Boston.


No better coupler made.
4 Wheel, $3.
5 Wheel, $3.
Guaranteed.
R. A. HART, BATTLE CREEK, MICH.

HENDRICKS BROTHERS
PROPRIETORS OF THE
Copper Rolling Mills,
MANUFACTURERS OF
Bolt and Sheathing
COPPER,
COPPER WIRE AND RIVETS.
Importers and Dealers in
Ingot Copper, Block Tin, Spelter, Lead, Antimony, etc.
49 CLIFF ST., NEW YORK.

THE IRON AGE

THURSDAY, SEPTEMBER 10, 1903.

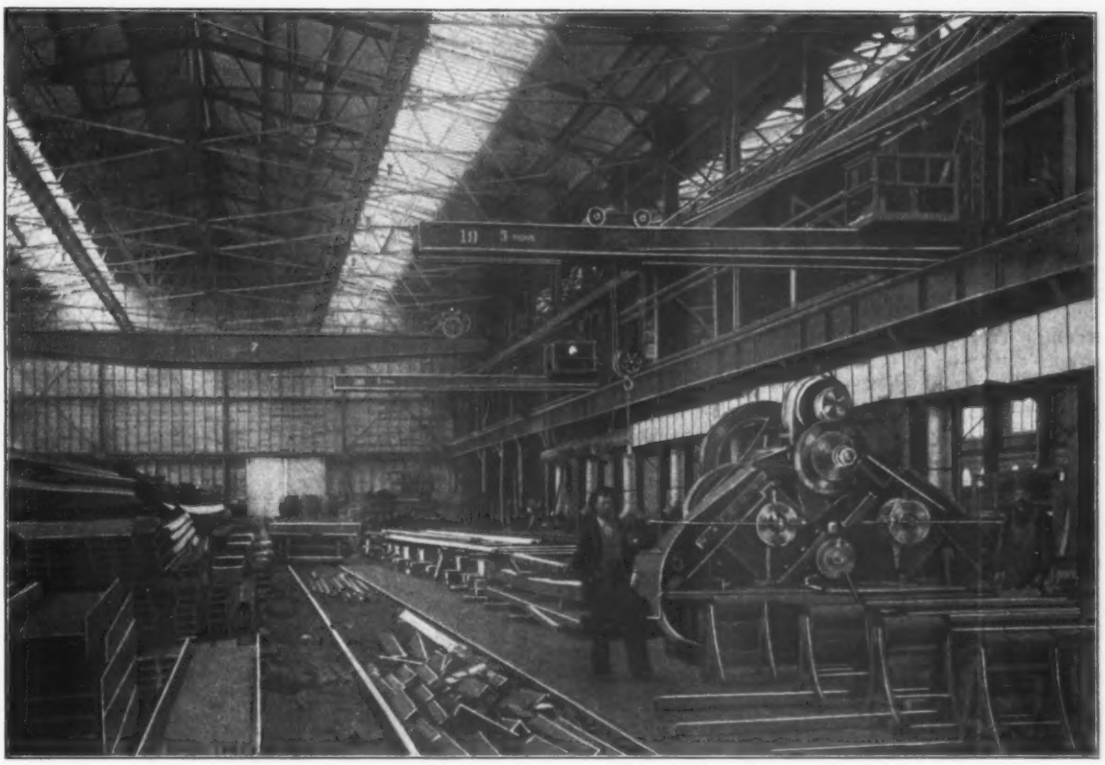
A Model Bridge and Construction Shop.—I.

Pennsylvania Steel Company's New Plant.

What is easily the finest bridge shop in the United States is the one recently completed by the Pennsylvania Steel Company at Steelton, Pa. In making this statement we take into consideration every feature of the new works and find their superiority demonstrated in each case. The main characteristics of the plant and those which particularly mark its originality are: 1, The general design and arrangement of the buildings; 2, the provisions made for the quick, convenient and direct handling of all supplies and materials; and, 3, the wonderful adaptability of the many special tools which have been provided.

In these days of making provision for the future it goes without saying that an almost unlimited extension can be made whenever desirable. This can be accomplished without interfering in the least with the present layout of the plant or with the methods pursued in carrying on the work. Expressed in another way, an addition, no matter of what magnitude nor to what department, would merely increase the size without altering or inconveniencing the system in vogue. In a works of this type all material is taken through in a direct line. By this we mean that the raw material enters at one end, passes from one department to the next in advance, and so on through the buildings to the shipping or storing yard. In no case is it necessary to retrace a step already taken. The problem therefore of increasing the capacity becomes a very simple one, no matter whether the addition be to the end of the main building or to one of the transepts. These transepts, by the way, are in each instance located adjacent to the department to which most of their work goes.

The works are placed parallel with the Pennsylvania Railroad, and are traversed by tracks as indicated on the map, Fig. 2. Once inside the buildings all material is handled by electric traveling cranes and trucks or narrow gauge cars. In addition there is an elaborate system of traveling jib or wall cranes, which constitute one of the most unique features of the entire equipment. It will be seen, as we progress with our description, that appliances for moving material have been supplied in abundance. These, together with the plan of the receiving yard and gantry yard, will receive more detailed attention further on.



View in Receiving Yard.

A MODEL BRIDGE AND CONSTRUCTION SHOP.

The special tools—we now refer especially to the traveling wall radial drills and the traveling jib cranes, both of which were designed by J. V. W. Reynders, the superintendent of the bridge and construction department—are remarkable for the simplicity of their design, for their effectiveness in operation and for their unique disposition. All the standard machines are the best of their respective types.

Building the several members of a bridge is a comparatively simple task noted more for the constant repetition of many of the operations than for anything else. The shape or plate is cut to size, punched, assembled and riveted. Most of the time consumed is for reaming the holes and riveting. But this simple statement conveys no indication of the vast amount of detail work involved. This repetition made possible such an arrangement of similar tools, operated absolutely independently, as insured rapid production at minimum expenditure.

In locating the machines great care was exercised in providing ample space about each for the proper handling of work. The passageways are all wide and free from obstructions. There was not the least attempt to restrict the size of the buildings by crowding the appliances. In fact, a bird's eye view of any department would indicate that the tools had been first grouped with enough space about each, and then a little more space had been added to each to make sure. We may take the plate and beam punching machines as illustrations. Not only is there plenty of working room, but there is space to receive work to be done. By this means there is no delay at or about the machine, and no waiting for material to be brought from some more or less distant part of the plant.

General Arrangement.

The general arrangement of the works will be understood from the map, Fig. 2, the buildings indicated by full lines being now erected, while the dotted lines show contemplated extensions. Plates and shapes are received at the west end, where they are handled by a gantry crane having a span of 85 feet and a travel of 1000 feet. Here we find a simple and effective plan for handling supplies —one in which there is no confusion and in which all parts of every job are kept together. The ground covered by the gantry is divided into spaces, checker board fashion. To each space is allotted one or more drawings, according to the size of the job and the number of pieces called for. Every piece specified on the drawing is placed in its proper position, and no foreign supplies are permitted to encroach. The extreme simplicity of the scheme is its best recommendation.

The gantry is supplied with two hoists, a main and an auxiliary, and is capable of lifting 15 tons. The hoisting speed of the main hook is 15 feet per minute, the trolley speed 150 feet per minute and the bridge speed 350 feet per minute. The auxiliary hoist has a lifting speed of 40 feet per minute. The clear hight of the hook above ground is 24 feet, and the surface of the ground is 15 inches below the rails. The crane was built by the Alliance Machine Tool Company.

From here the material is taken to the receiving yard, which adjoins the templet shop. This building now measures 340 feet in length by 176 feet 8 inches in width, or twice as wide as the adjoining punching, assembling and riveting building. The parts are here marked according to the patterns received from the templet shop. All the heaviest work is done here, such as plate bending, straightening, cutting and planing, and the cutting of beams, channels and angles. The parts then enter the next building, which they pass through to the finishing and painting end. Here should be noted the disposition of the transepts. The hydraulic outfit is located adjacent to the punch shop, while the small machine shop and blacksmith shop, the services of which are demanded by all the departments, are placed near the center. The principal office will be about at the center of the plant when all the additions have been completed.

Architectural Features.

The æsthetic as well as the strict utilitarian appears in the design of the buildings. Particular attention has been paid to the grouping of the several structures and to the harmonious assembling of their most prominent features. The result is exceedingly pleasing from all viewpoints.

Each building is of skeleton steel construction, the walls of the first story being brick, and thence up to the eaves of concrete. No load whatever is carried by the walls, the entire roof and interior loads being supported by the steel frame. The concrete portion of the walls is 2 inches thick, and expanded metal is imbedded in them. In construction, the expanded metal was first placed in position and then stretched. Upon this were then placed three coats of cement. The first was mixed 1 cement to 2 of lime, sand sufficient to make the mixture of the proper consistency being added. The second and third coats were 1 cement to 2 of sand, Mount Holly sand being used in the outside coat to give it a slightly yellow tone. The roofs are asphalted felt with slag on top. In the shops there are 82 cubic feet of inclosure to 1 square foot of glass, and 2½ square feet of floor area to 1 square foot of glass.

The office is 115 x 56 feet, three stories and basement,

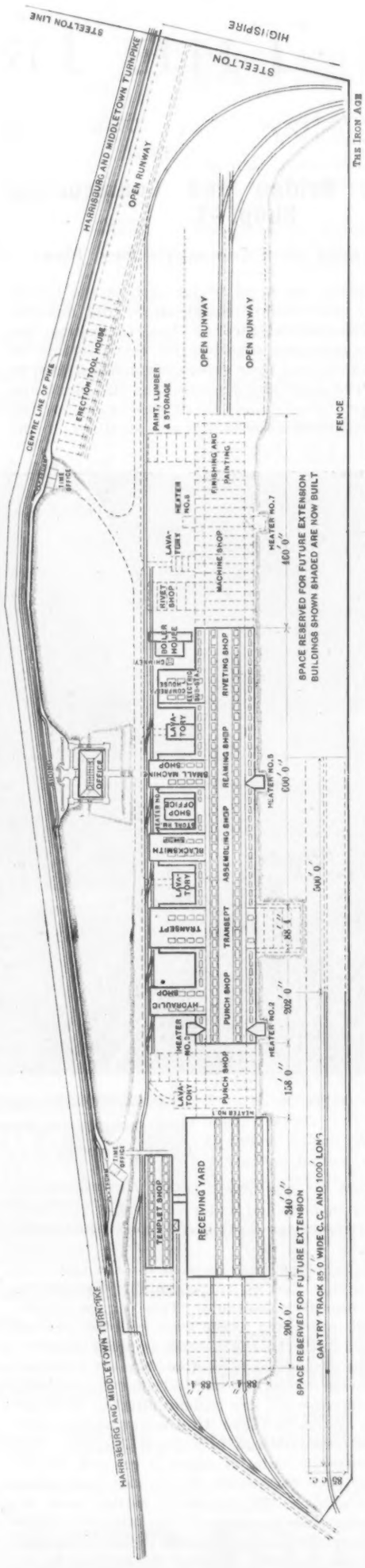
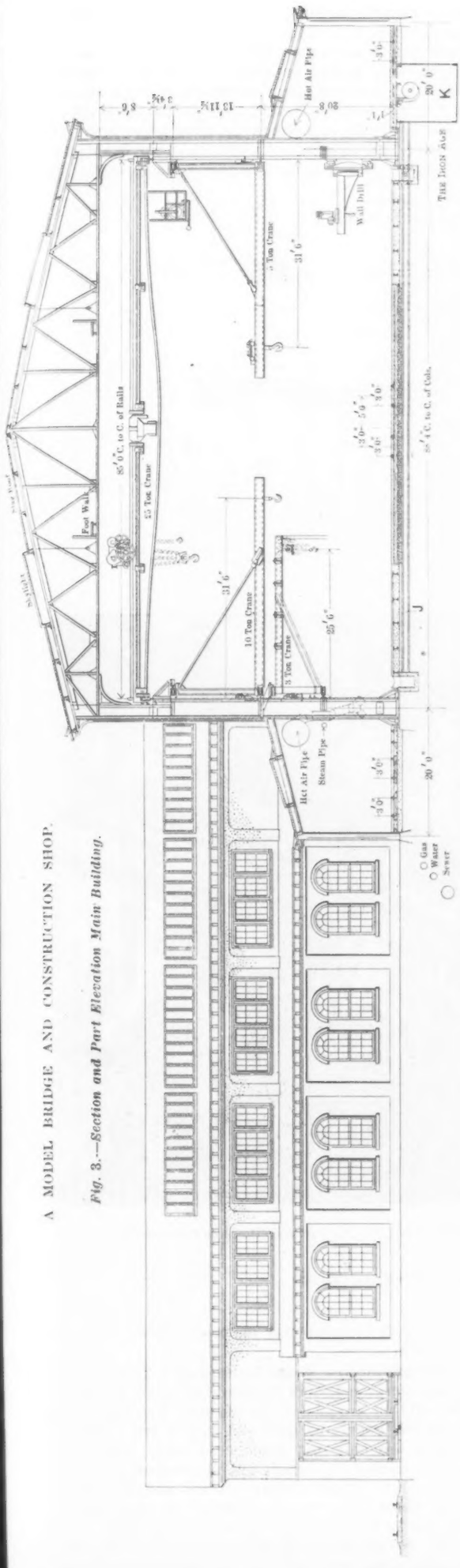


Fig 2.—Map of Works.—Completed Portions Are Indicated by Full Lines; Contemplated Extensions Are Shown by Dotted Lines.

A MODEL BRIDGE AND CONSTRUCTION SHOP.



A MODEL BRIDGE AND CONSTRUCTION SHOP.

Fig. 3.—Section and Part Elevation Main Building.

and is built of brick and cement stucco of a color in keeping with the other buildings. The basement is devoted to clerks, erection drafting room, fire proof storage room for drawings and records. The first floor is occupied by the administration department, superintendent and assistant superintendent, stenographers, superintendent of erection, engineer of construction, cost clerks, and so on. On the second floor are the drafting room, recreation and reading room, dining room and kitchen. The third floor is a drafting room. The building is heated with the Sturtevant hot blast system. All the partitions are of hollow tile.

Heating and Ventilating System.

It is here that we find one of the most striking and novel innovations in bridge shop construction, and one which forcibly illustrates the wisdom and far sightedness of the management that planned these works. In designing bridge shops it has been the custom, practically universal, to fail to provide any shelter for some of the departments, and to furnish others with only a roof mounted upon posts, the sides being open to admit the tempest and the winds that blow both winter and summer. The latitude of the place has had but little or no influence upon the design, and open sheds are to be seen north and south. For some inexplicable reason the question has not been influenced at all by the fact that a man cannot do his best when in physical discomfort and when surrounded by everything tending to make him mentally miserable. But the time is evidently past when any old thing in the shape of a building is thought to be sufficiently good for a bridge shop.

It remained for the Pennsylvania Steel Company to provide every department with a substantial building of pleasing design, equal in every way to any of the structures erected in recent years for manufacturing purposes. They went even further and furnished every building with a complete and efficient heating and ventilating outfit. The writer visited the works last winter when the thermometer had been hovering about the zero mark for several days and found every department as comfortably heated as could be desired. There was no chill in the interior, as might have been reasonably expected from the outside conditions. Even the receiving yard, where material enters the plant, was warm.

Steel which has been exposed to rain and snow can scarcely be made absolutely free from rust, no matter what subsequent means may be employed. Moreover, when being laid off to templet, and when being worked upon, the material should be at a normal temperature. For these reasons, as well as the comfort of the workingmen, it was considered essential to receive material in a warm, covered building, thereby avoiding all delays and interruptions due to outside weather conditions. During the cold weather the men were contented and cheerful, and evidently pleased with their environment.

The heating and ventilating apparatus was installed by the B. F. Sturtevant Company of Boston. The general scheme of the layout is shown quite fully by the drawings, Fig. 6. There are, as will be noted, eight fan and heater equipments, consisting each of a steam coil heater in connection with a steam engine driven blast wheel. In each case the heater provided is built on their patent corrugated cast iron sectional bases, with 1-inch steam pipes set staggered and at the proper distance on centers to obtain the highest efficiency from the heating surfaces without restricting the passage of the air. The sections rest on heavy wrought iron bases with ample provision for contraction and expansion. The fans are inclosed in three-quarter steel plate housings, the lower part of the fan scroll being underground and forming a part of the foundation. The fan is driven by a direct connected horizontal side crank engine. A system of galvanized iron pipe, Fig. 5, distributes the air throughout the buildings, the air being discharged through branch drop connections having outlets near the floor. The ducts are of large size with bends of long radius to reduce the frictional losses to a minimum. Each drop pipe is fitted with a butterfly damper, with a counterweight for holding the same open or closed as may be desired. The entire apparatus is of sufficient capacity to heat the various buildings to 65 degrees F. in zero

weather. In the case of the receiving shed this applies only to a section 50 feet in width in the middle of the building, but extending its whole length. Under the conditions of the contract the heater has to take all the fresh air from out of doors. However, as the number of occupants in the building is few compared with the cubic contents, it will be found perfectly feasible and more economical to return a certain portion of the air from the buildings. The apparatus is capable of changing the air

the current is reduced by transformers to 440 volts, which is the operating voltage for the motors. Three-phase induction motors are employed on all machines, but the crane motors are supplied with direct current at 250 volts. Westinghouse and General Electric motors are used on the large units and Sprague on the small. The capacity of the substation is 1200 horse-power, with room for 1200 additional. Compressed air is supplied by two Rand two-cylinder compound compressors direct

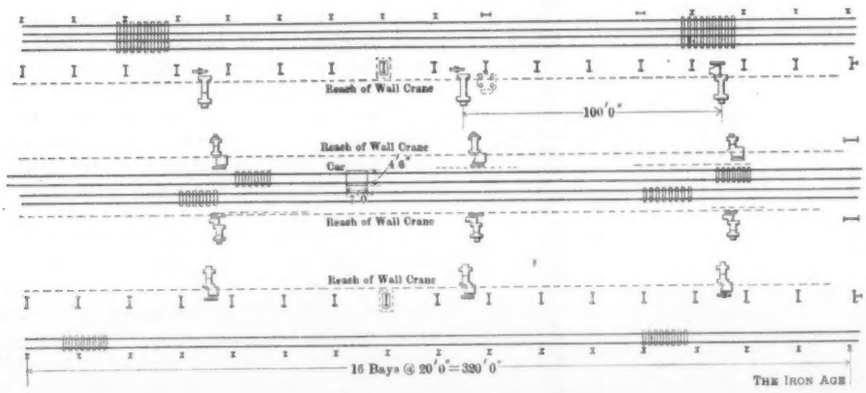


Fig. 4.—Part Plan Punch Shop.

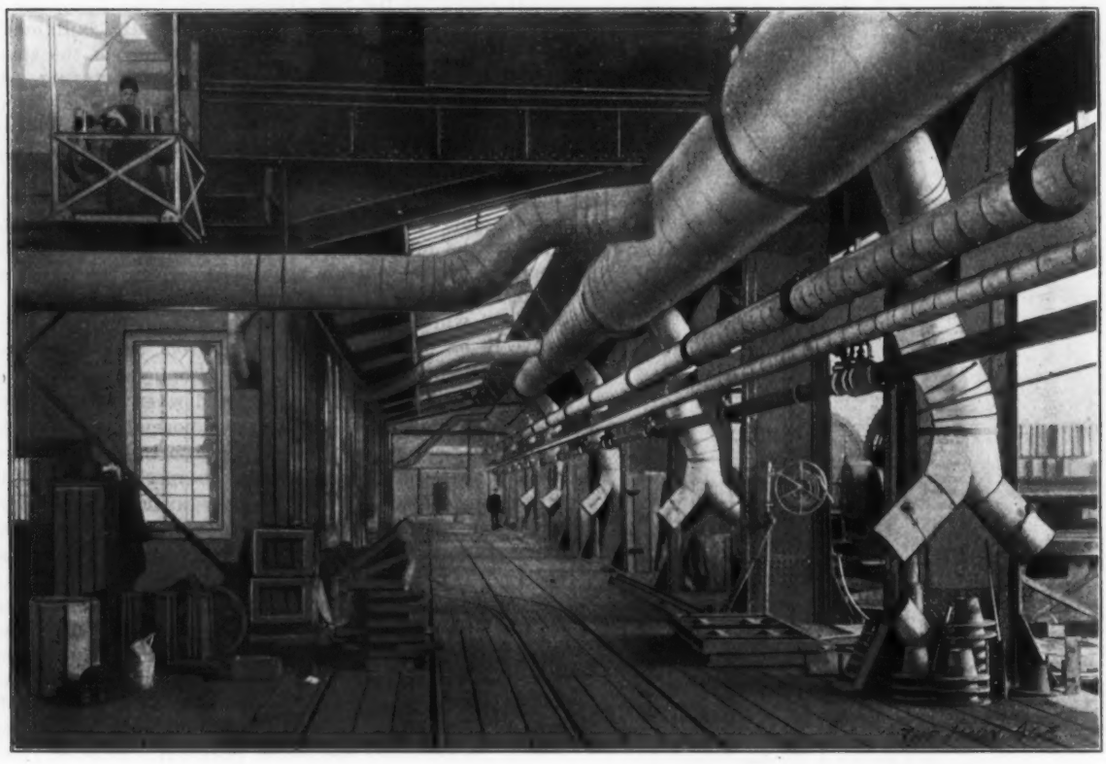


Fig. 5.—View Showing a Portion of the Heating and Ventilating Pipes, the Air Pressure Pipes and Steam Pipes.

A MODEL BRIDGE AND CONSTRUCTION SHOP.

in all the buildings every 25 minutes, and in the paint shops every 20 minutes. The office building in connection with the bridge department is also heated by this Sturtevant system. Steam is supplied by two 250 horse-power Babcock & Wilcox boilers having Roney mechanical stokers. This is only half the contemplated power. There is also a conveying system for coal and ashes.

Electricity.

All of the tools and cranes, except, of course, the hydraulic and pneumatic, are electrically driven. Each machine is therefore self contained and independent. Current is derived from the main station, about 2 miles distant, by a pole line carrying a three-phase alternating system at a pressure of 11,000 volts. At the works

driven by 300 horse-power motors. The three-wire Edison system is used.

Throughout the shops inclosed arc lights are used, having mirror reflectors designed especially for the height at which they are placed. In the main building the lamps are 46 feet above the floor and 32 feet from each other. There is a double row through the shop. The reflectors are so designed that there are no shadows on the floor as the cones of light overlap. In the smaller buildings a flatter shade gives the same effect. Every ninth arc on each side of the big shop is a watchman's light.

The feeder system is ample, there being two sets for the motors and three for the incandescents and three for the arcs, all being separate. These feeders are 250,000

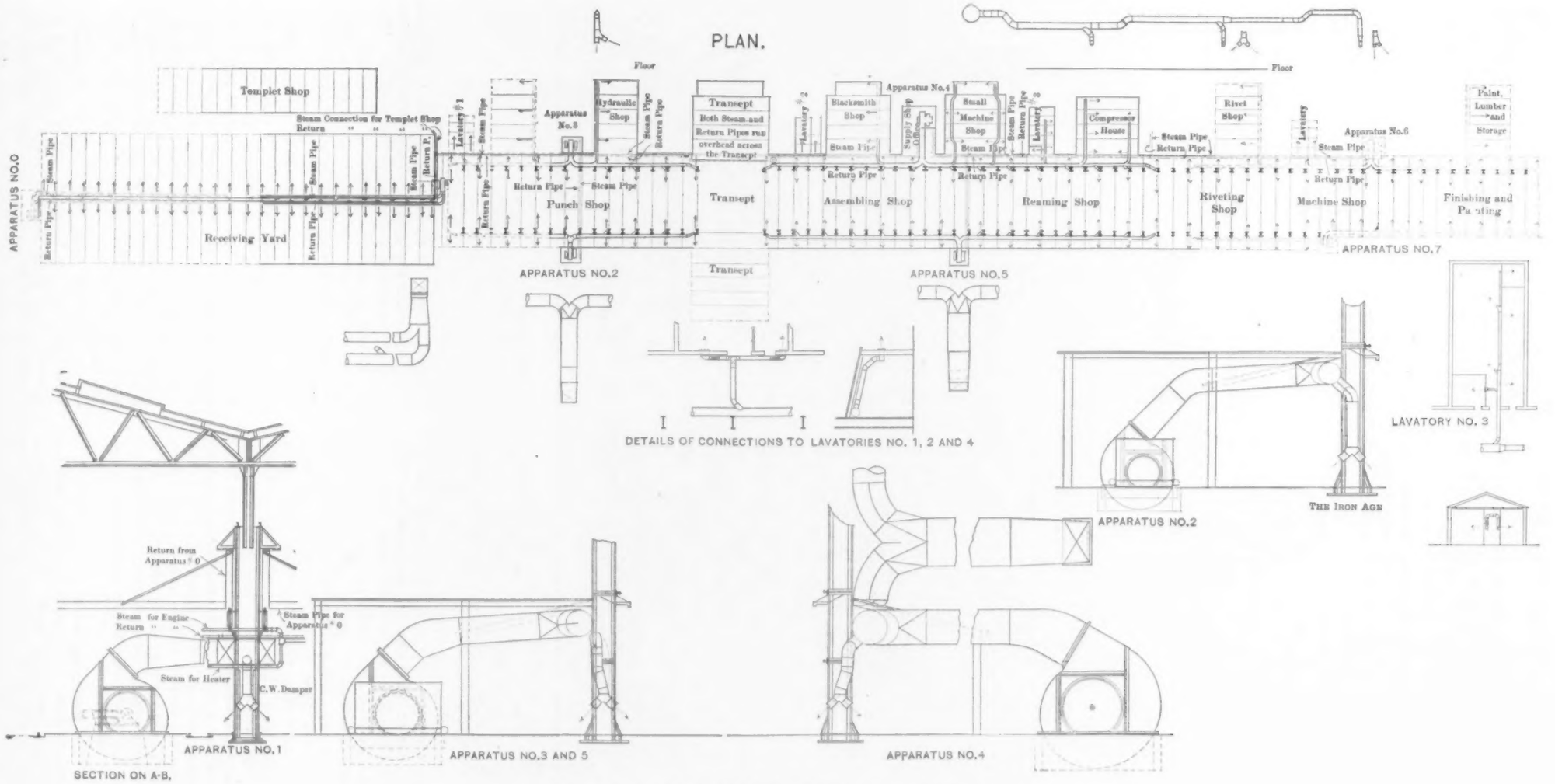


Fig. 6.—Details of Heating and Ventilating System.

A MODEL BRIDGE AND CONSTRUCTION SHOP.

circular mills, except one pair of arc feed of 500,000 circular mills.

The wires are brought down the columns in Sprague conduit pipe. All cranes pick current from the rails by shoes, these rails, in the case of the wall cranes, being placed between the supporting tracks. The lower row of wall cranes is supplied with 5 horse-power motors for the bridge and 2 horse-power for the hoist. The next row of cranes has 25 horse-power for traveling and 8 horse-power for hoisting. All of these motors, except he 25 horse-power, are of the inclosed type.

Templet Shop.

The templet shop measures 60 x 240 feet, and is two stories in hight. One end of the first floor is used for storage of lumber, the center is a machine shop, while in the other end, are stored the finished templets. On this floor is a full line of wood working machines by which the lumber is dressed for the templet room above. In this room are 50 tables, each 7 feet 10 inches by 16 feet, arranged across the room. In the way of tools there are three post borers, one band, one circular and one jig saw and one planer. The room is heated by steam radiators hung along the walls from the roof trusses. Light is received through ribbed glass in the windows and skylights. Artificial illumination is furnished by 12 inclosed arc lights with top reflectors and 100 incandescent lamps located around the walls. The incandescent lamps are placed in eight groups, each controlled by its own switch, so that any desired section of the room can be lighted without bringing into use the entire system. At every 30 feet in the floor are holes into which the shavings are swept. These are then removed by a fan to an independent building.

Receiving Yard.

As has already been said, the largest and heaviest machines are in the receiving yard. At the entrance is the electrically driven plate bending and straightening roll shown in Fig. 8. The chamfering machine, Fig. 9, is intended for beveling the edges of angles, two angles being operated upon at the same time. The angles are placed in the machine as indicated by the engraving. The milling cutter is of the shape of a double cone, and is carried by a vertically moving head. The beveling is done by the cutter moving down between the angles. The angles are held by V-shaped clamps actuated by hand wheel screws, carried one on each side of a yoke.

The facing machine, Fig. 10, is similar in every way to a rail facer. At one end is the cutter head, which resembles an ordinary lathe head stock, the face plate of which has three wide cutters which revolve in the same vertical plane. The cutting head is moved toward the head by a screw.

In this department is a Hilles & Jones plate planing machine capable of planing plates 32 feet long at one set-

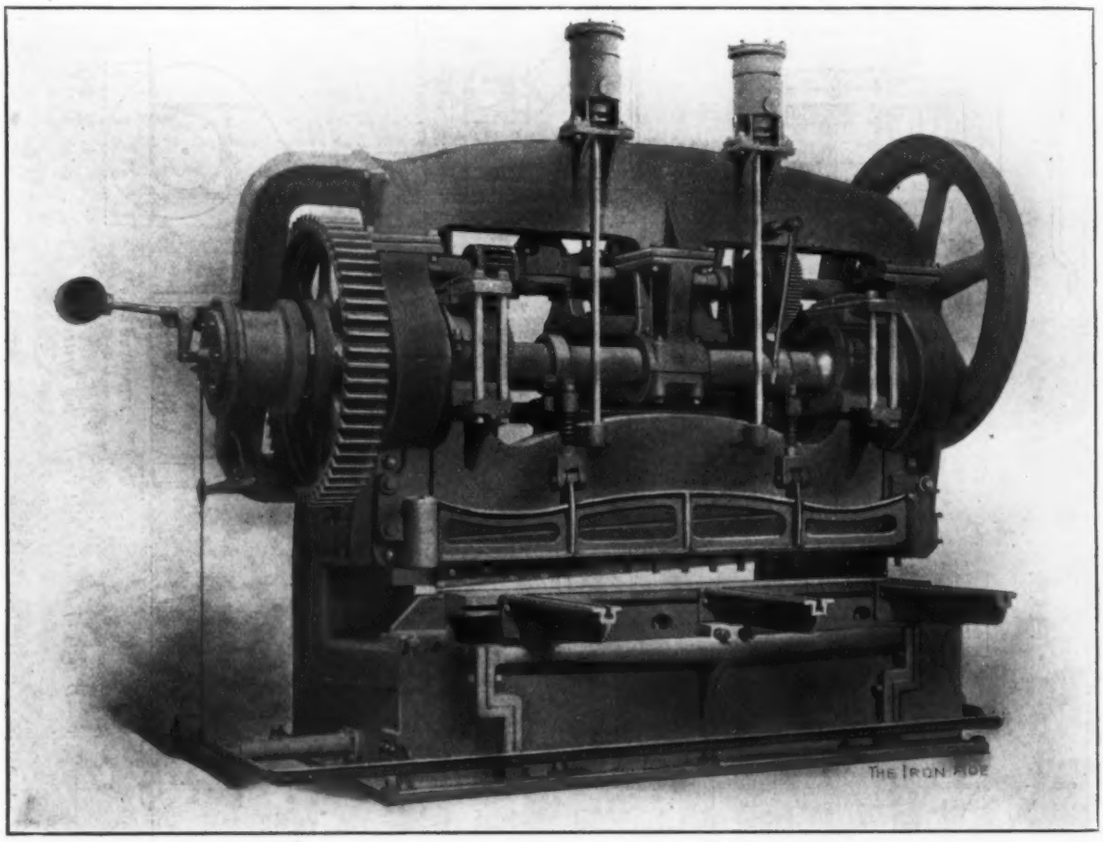


Fig. 7.—Hilles & Jones Gate Shear.

A MODEL BRIDGE AND CONSTRUCTION SHOP.

ting, or plates of any length by resetting. The clamping is done by means of a heavy double web plate girder operated by hydraulic cylinders in the housings. There are two tools in the saddle, one cutting in each direction. The main driving screw is supported its entire length, and each end is fitted with roller bearings to take the thrust of the cut.

The double angle shear shown at the left in Fig. 1, built by the same company, will cut 10 10 x 1¼ inch steel angles square off or on a bevel, either right or left hand. The drive is by a 20 horse-power motor placed on top of the frame and directly connected through cut gears and a friction clutch. The frames and gearing are of cast steel, and the machine is mounted upon a turn table 10 feet in diameter. Both ends of the machine are entirely independent, so that two gangs of men can work upon it at the same time. The knives are rectangular, and all have four cutting edges.

The Hilles & Jones gate shear, Fig. 7, measures 25 inches between the housings, and is capable of shearing plates 1 inch thick the full width at one stroke. The driving is by a 40 horse-power motor directly connected to the fly wheel shaft through cut gears and a fric-on

clutch, the friction clutch allowing the motor to be run to full speed before starting the fly wheel. The machine is supplied with automatic clamping arrangement, the beam being of cast steel. An automatic stop brings the head to rest at the top of each stroke.

There is also a horizontal bending and straightening press, driven by a 15 horse-power motor, and having a capacity of 8 x 8 x 1 inch angles, or 15-inch I-beams and channels. The adjustment is by means of a hand wheel and revolving nut, the total adjustment being 5 inches.

This shop, as will be noticed by the engravings, is divided into two equal parts, longitudinally, by a row of columns which support the cranes. On the south side (that indicated in Fig. 1) are three 5-ton traveling wall cranes, and on the north side two of the same type. There is one electric traveling crane of the full span in both departments.

(To be continued.)

The Iron and Steel Institute closed its autumn meeting at Barrow-in-Furness, England, on September 3. An invitation to hold a meeting in the United States in the autumn of next year, which was extended by Charles Kirchhoff, ex-president of the American Institute of Mining Engineers, was unanimously accepted. Andrew Carnegie, president of the Iron and Steel Institute, said he regarded the acceptance of the invitation as an international event pregnant with beneficial results. The next meeting of the institute will take place in London in May, 1904.

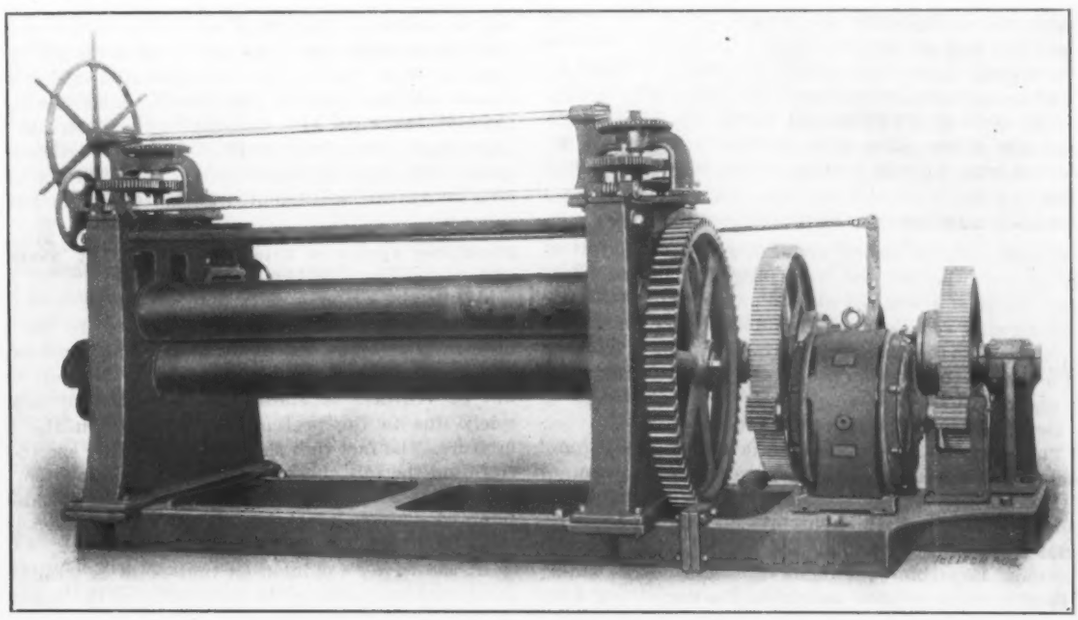


Fig. 8.—Bending and Straightening Machine.

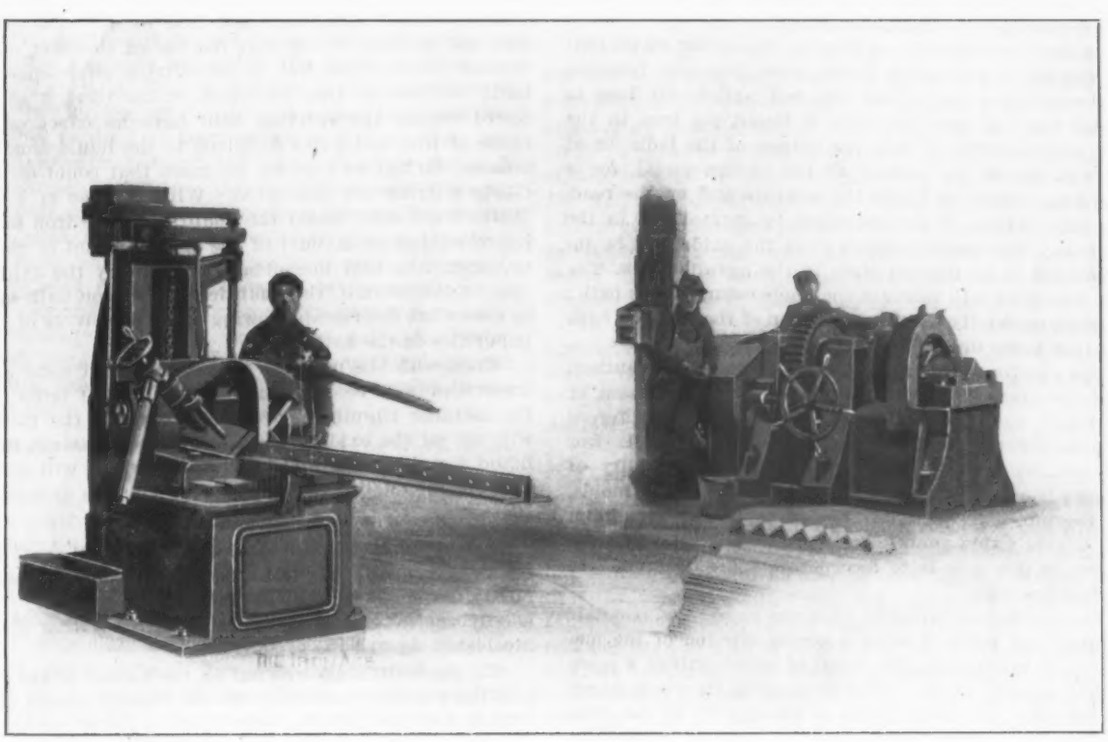


Fig. 9.—Chamfering Machine. *Fig. 10.—Facing Machine.*

A MODEL BRIDGE AND CONSTRUCTION SHOP.

Manufacture of Sound Castings by Means of Thermit.

BY J. B. NAU, NEW YORK.

In the issue of *Stahl und Eisen* for August 15 there appears a paper by W. Mathesius, chief engineer of the chemical factory of the firm of Th. Goldschmidt of Essen, Germany, on the application of thermit to the production of sound castings of iron and steel. The paper, besides very valuable information, well worth while to bring to the attention of the metallurgist and foundryman, contains also some statements with which the writer does not entirely agree. He will, therefore, review those points that have a direct bearing on the subject of sound castings.

Nature and Effects Attributed to Thermit.

The author starts out by giving a general description of the mixture thermit and its principal qualities. This mixture, made of powdered aluminum and iron oxide or any other oxide, from which it is intended to extract the metal, possesses the property that, when once ignited, say at a corner, the ignition propagates itself through the whole mass with the following results:

1. Development of a high temperature.
2. The reduction in its liquid state of the metal from the metallic oxide, mixed with the powdered aluminum.
3. The burning of the metal aluminum to its oxide alumina, obtained in its molten state under the shape of artificial corundum.

The most important quality of this mixture is, however, that it burns without requiring the use of any additional gas, and that its products of combustion contain no gases. It is this last property that, according to the author, makes very valuable the application of thermit to foundry purposes with the special aim of obtaining sound castings free from blow holes.

In order to obtain these results, the author states that the thermit is inclosed in a thin sheet iron box, fastened to the end of a dry, clean iron rod, sufficiently long to plunge the box into the bath of liquid pig iron in the ladle and maintain it near the bottom of the ladle, or at any rate below the surface of the molten metal, for a time long enough to ignite the mixture and let the reaction take place. If the operation be carried out in the right way, the metal reduced from the oxide will be incorporated in its nascent state in the metallic bath. The heat developed will increase the temperature of the bath; but more especially a strong agitation of the metallic bath will take place during the reaction.

The results of this agitation, according to the author, is of the greatest importance as to the improvement of the liquid metal treated. He states that for different purposes different compositions of thermit are used. For instance, when it is desired to improve the quality of foundry iron before casting it from the ladle in the molds, the thermit used is a mixture of powdered aluminum and titanic oxide containing some iron oxide. The intention in this case is to incorporate some titanium into the foundry iron.

The whole reaction lasts from one to one and one-half minutes, and while it lasts, a strong stirring of the metallic bath takes place, the result of which will be a more uniform quality of the metal throughout its whole mass, and therefore an amelioration of the quality of the iron.

Here the author states: This can only be understood when it is remembered that pig iron, when charged in the cupola, is, in most cases, made up of a mixture of three to four different brands of iron, which, running from the cupola into the ladle, have no time to become intimately mixed to form a bath of uniform composition. The only mixing operation to which these different brands of iron are subject, is due to the stirring produced by the stream of liquid metal flowing from the cupola and striking the liquid metal already contained in the ladle, and to the further stirring that will take place when the metal is cast from the ladle into the molds.

The author contends that a stream of liquid pig iron running from the cupola and striking the metal already contained in the ladle, on account of the great density of the metal, can only create little stirring action. In this respect the writer does not quite agree with the author. A stream of liquid falling into a bath of liquid of the same density will create a heavy stirring action. A stream of water, falling from a hight of several feet would sufficiently illustrate it to a casual observer.

The author goes on advocating the beneficial effect of the mixing of the thermit, saying: The effect of the mixing by means of thermit is noticeable to the eye of the experienced observer. The stream of ordinary cast iron running from the cupola is nontransparent, while the stream of iron treated with thermit and flowing from the ladle, is bright and transparent like a stream of crucible steel. The fracture of the iron also shows a fine grain; the iron becomes denser and takes a superior polish. All this is attributed to the stirring action of the thermit.

Purifying Action of Titanium Proved by Tests Made in the United States.

While the writer admits that the qualities of the iron containing titanium are such as described by the author, he cannot give the benefit of those improvements to the simple stirring of the metallic bath by thermit as such, but he ventures to state, that those improvements are solely due to the presence of titanium in the thermit mixture. The fact that the author carefully specifies, that titanium thermit should be used in the operation, proves amply, in our opinion, that he would not expect the above improvements to take place, were another thermit than titanium thermit resorted to.

If the writer's opinion on that point is wrong, and if the actual improvement in the quality of the metal is due to the stirring of the metal, a simple experiment will demonstrate it. Instead of taking a titanium thermit, the author of the paper might try to stir the bath with the use of a different thermit—for instance, one made with powdered aluminum and iron oxide. The writer does not hesitate to say that the use of this last named thermit would have less or no stirring effect upon the bath, because the iron contained in the thermit and reduced during the reaction, will have no effect on the oxide of iron and gases dissolved in the liquid iron, and because during the reaction no gases that could actually create stirring are generated. With the use of such a thermit, not only would the qualities of the iron not be improved, but on account of the small amount of gangue or impurities, that unavoidably accompany the oxide of iron in the thermit, the qualities of the iron bath might be somewhat deteriorated, owing to the dissolving of those impurities in the bath.

Even with the use of a titanium thermit some small impurities will be introduced. But in the latter case the metallic titanium, once freed, but not the thermit, will act on the oxide of iron and gases dissolved in the liquid metallic bath, and by removing them will greatly improve the qualities of the iron.

Results of Experiments.

As a proof of this assertion the writer will quote here the result of an experiment reported to him, but where ferro-titanium was used as the purifying agent. This is only one experiment out of a great many that always invariably showed the same results:

The ferro-titanium was put on the bottom of the ladle and the pig iron, running from the cupola, poured on it. During the time that the ferro-titanium melts, the bath is agitated to a certain extent and a light scum rises from the metal and floats on top of the bath. Such an effect does not happen when no ferro-titanium is used. In all these experiments no thermit was used, but the pure metal titanium in the shape of ferro-titanium. In each and every case the treated metal is thoroughly purified and greatly improved in quality.

In another case, also quoted to the writer, a ladle full of metal was treated with about 1 per cent. of ferro-titanium containing 25 per cent. of titanium. Here again the same purifying action took place and the quality of the iron was improved to the extent of more than 20 per cent tensile and transverse strength.

But when with the same iron and at about the same

temperature 2 per cent. of ferro-titanium with 25 per cent. of titanium was used only part of the ferro-titanium was used up in the operation, the balance remaining untouched. While this occurrence may solely be due to the possible fact that the temperature of the liquid metal was not high enough to melt up the whole amount of the ferro-titanium, it may be due to some other cause as well.

A 25 per cent. ferro-titanium is more refractory than ordinary cast iron, but it is lighter, too. Such a ferro may therefore not remain at the bottom of the ladle, but may rise in the bath, and coming in contact with the impurities contained in the liquid pig iron, may be chemically dissolved by the impurities that it removes, and when the right amount of titanium has been consumed in this purifying operation the balance of the ferro-titanium, finding no further impurities to be eliminated, and too refractory to melt, may remain and be found at the bottom of the ladle after the operation. This, of course, is only a personal opinion, which, however, seems to be sustained by the facts above quoted.

The results of many other experiments made on a large scale in the United States, where foundry iron, car wheel iron, tool and other steel were treated by ferro-titanium with the intention to improve their quality could be reproduced here. Each and every one would show a marked improvement in the quality of the treated metal. But as the writer is informed to the effect that these results will shortly be published in extenso, he refrains from reproducing any more here.

The few examples above quoted and the results of the many tests that will be published show conclusively that foundry iron of every description, steel castings and other steels, when treated in the right way with titanium or ferro-titanium, have their qualilities improved in a remarkable degree, and that these improvements are solely due to the action of the metallic titanium employed. The writer may, therefore, be allowed to state again, that when titanium thermit is used in the treatment of metals for foundry purposes or others, the great amelioration noticed in their qualities is not due to the reaction created by the melting of the thermit unavoidably impure, but simply to the fact that, owing to this reaction, metallic titanium is reduced and introduced into the bath of molten metal, and that this metallic titanium, on account of its great purifying action, improves the quality of the metal, and that this quality is further improved by the small amount of titanium that after the purifying is finished remains incorporated in the metal.

The assumption that titanium acts mainly as a purifier is proved by the fact that liquid pig iron treated with this metal will be greatly and invariably improved in quality, even if no trace of titanium remains in the finished metal.

Purifying Action of Titanium Proved by Tests Made in Germany.

Returning now to the author's paper, he admits himself the purifying action of titanium when he says that titanium has the property of combining with the nitrogen contained in the iron and eliminating it in the shape of cyanonitride of titanium, the well-known small red crystals often seen in salamander in blast furnace practice. He goes on to state that, whether iron be freed from its occluded gases through the reaction created by the thermit, or on account of the addition of titanium, the fact remains that iron treated with titanium is free from blow holes, and the surface of the metal, after the reaction has taken place, becomes perfectly quiet. Comparative tests that the author publishes to prove the above statements show that open, sound cast iron plates made with ordinary iron, after they had been planed, had a porous surface, while similar plates, made from cast iron previously treated with titanium thermit after being planed, had a perfectly dense surface, without a trace of porosity.

The plates must be cast in dry sand. Even if this was carefully done, the same distinction was noticed in the two kinds of plates. This he explains through the fact that the addition of titanium allows the removal of the nitrogen from the iron or its absorption by the latter, rendering thereby its presence inoffensive in so far as blow holes are concerned. This was further proved by another simple test.

It is impossible to make in a closed mold plates with an even surface free from blow holes, because the air bubbles, adhering to the undersurface of the top part of the mold, cannot be entirely removed in the ordinary practice. But as soon as the cast iron used contains a little titanium this latter will at once unite with the nitrogen in the air bubbles, whose oxygen will form with the liquid metal in contact a small amount of oxide of iron, which will become dissolved in the metal and the bubbles will disappear. Numerous observations to that effect were made by the author, and invariably the same favorable results were noticed. A little later on, the author states, that the application of the treatment to the improvement of cast iron will involve a cost of from 75 cents to $1.50 per ton of iron, but that this increase in the cost price is more than counterbalanced by the improvements in the qualities of the castings, which are so pronounced that numerous cases could be quoted from everyday practice where castings, that were invariably defective when obtained from ordinary nontreated cast iron, came out flawless and perfect as soon as the metal was treated with titanium.

Action of Titanium on Steel Castings.

Here the author leaves the subject of cast iron and foundry practice to give his attention to the improvement obtained in a similar manner in the case of steel castings. Here also, when the treatment is applied in the right manner, blow holes are completely removed and the quality of the metal greatly improved in other respects. The results obtained with steel, being similar to what has been obtained with cast iron, it is unnecessary to consider this part of the paper. The writer will state, however, that the hollow space, in the top of steel ingots, is claimed to be removed whenever the method is applied.

Welding with Thermit.

The last part of the paper treats of the application of thermit to welding purposes. In this case the thermit is a mixture of powdered aluminum and iron oxide, and its application has for special aim to obtain the high temperature required in that operation. As the consideration of this part of the paper would carry its discussion too far, and as, furthermore, the readers of *The Iron Age*, from previous writings published on that subject, are well acquainted wth the excellent results obtained wth the use of thermit in welding operations, the writer does not propose to follow it, interesting as it undoubtedly is.

In concluding this paper the writer will add some further remarks on results obtained in the United States, corroborating entirely what has been said above in regard to cast iron plates.

Action of Titanium in Cupola and Blast Furnace Mixtures.

Foundry iron of good quality was melted in a cupola in the ordinary way and afterward cast into chill molds. The small pigs obtained, which the writer has seen, and which everybody who wishes can inspect, are perfectly sound, but contain a certain number of blow holes scattered all over the faces in contact wth the chill mold. The same foundry iron melted in the cupola with an addition of 1 to 2 per cent. of a 10 to 15 per cent. ferro-titanium in the mixture produced pigs with a perfectly smooth surface and without a trace of blow holes. The analysis of the last pig iron showed the presence in the iron of from 0.1 to 0.2 per cent. of titanium. Its tensile strength was increased by about 25 per cent. These tests were made at Cramp's ship yard.

In the same place cast iron containing a certain percentage of nickel, after being treated with a certain amount of ferro-titanium, had its tensile strength materially increased.

The writer will further state that years ago, while he was general superintendent of a large steel plant in the far West, he had his first opportunity to ascertain to a certain extent the influence that titanium has on the quality of cast iron. In those works a large supply of titaniferous ore was on hand, but none was used in the blast furnace. But it was used with excellent results as fettling in the puddling furnaces. The puddle cinder run

off from those furnaces, besides the usual amount of oxide of iron, contained on an average about 10 per cent. of titanic acid.

After the cinder had accumulated for a certain length of time and enough was on hand, it was used to the extent of 25 per cent. in the burden of the blast furnace, which made the average content of titanic acid in the full burden equal to 2½ per cent. This was kept on as long as the supply of puddling cinder lasted. The resulting pig iron, sometimes Bessemer, sometimes foundry iron, was invariably of superior quality, resistant, tough to the point of nearly bending when trying to break it; it had a dense grain with a clear light bluish color instead of the clear, gray color of ordinarily good foundry iron. Whether used in the foundry or whether used in the steel works, the products obtained from it were invariably of remarkably good quality.

Pacific Coast News.

SAN FRANCISCO, CAL., September 5, 1903.—The business of the past two weeks has been interrupted by holiday making on the occasion of the celebration of the Grand Army exercises, which brought together many business men from all sections of the United States, including many engaged in the hardware and iron and steel industries. As a great many of our visitors have taken occasion to make themselves acquainted with the opportunities for business in many of the most promising sections of California there is no doubt that this will lead to the investment of more Eastern money in these industries. The past year has been one of unparalleled success in these various lines, and this is the best possible time to see them in good working order. Although the festivities and demonstrations of welcome interfered to some extent with the regular course of trade, they have also brought many from all parts of the coast who have taken the opportunity to find out what San Francisco can offer them in the way of business bargains.

We have had, of course, our troubles of one kind or another to interfere with the ordinary course of business, but not any more than the other sections of the country have themselves. The granting of a receivership for the Union Iron Works is not looked upon with favor by our business community. Henry T. Scott, representing the stockholders of the Union Iron Works, which leased its old plant from the shipbuilding company, fought the proposition hard, but the Court decided against them. Still Mr. Scott seems in no wise dismayed at the outcome and in answer to a question of your correspondent as to the effect that the receivership would have on the business replied, "None at all. Of course, the Government contracts in progress will not be interfered with, and the work will go on as now until they are completed. Meanwhile if matters should turn out unpleasantly the old company have backing enough to establish another yard here on the bay. We have two other shipyards, one the Risdon, a very fine one, and second only to the Union itself, with which no doubt a working arrangement could be established."

There has been a fair demand from foreign countries on the Pacific, but the totals of exports have not been as large as for some time previously. The falling off has been particularly notable in the Eastern transit trade with the Orient, but this has probably arisen from the very heavy shipments by the "Korea" and the "Siberia" on their earlier trips, and the heavy shipments made on some of the older steamers earlier in the year. The export of bicycles to Japan has been exceptionally heavy, while a great many have also been sent to Australia and New Zealand. The export of sewing machines has also been large, but most of these articles are light now. A good deal of hardware has been sent to Australia and the Orient. A great deal of sheet iron pipe has also been shipped, especially to the Hawaiian Islands. The exports of machinery have not been as large as in other years at this time. A market for it is principally found in Japan, Australia and New Zealand, as also in Mexico and Central America. A good deal of mining machinery has been taken in Western Mexico, particularly of late. Considerable electrical machinery has been sent to China and Japan. There have been large shipments of typewriters to Australia and elsewhere. A market has been found for agricultural machinery, especially of California manufacture. When Australia shall have gotten rid of the effects of her great drought she will take a large amount of agricultural machinery, engines, &c. There have been some large imports of iron and steel by sea of late. J. O. L.

The Dorr Fuel Process.

The International Fuel Company, Rutland, Vt., have been incorporated under the laws of Maine, with a capital stock of $100,000, for the purpose of exploiting the process invented by Henry R. Dorr for an improved fuel manufactured from coal waste. Patents have been granted to Mr. Dorr, covering the United States, Great Britain, Germany, Russia, Austria-Hungary, France, Spain, Belgium and Japan. His process is designed to utilize anthracite and bituminous coal dust. He first used a mineral binder, which made the dust hard and solid when molded into bricks, while the binder in combination with the coal dust became largely combustible. This, however, was not enough, as the bricks thus made, when heated to a high temperature, fell to pieces. It became evident that two binders were necessary, one to make the fuel so hard and solid that it would bear transportation without waste, and a second or supplementary binder to hold the lumps of fuel together while they were burning. After long research he discovered the second binder, which is itself a fuel, burns readily and binds the burning carbon particles together so firmly that each fuel brick retains its shape in ash after the fire has burned out, until it is disturbed. Then it crumbles into ashes as fine as sand, leaving no cinders and no clinkers. The waste from soft coal mines is converted by this process into a coal as hard as anthracite, producing no dark smoke, and in certain particulars is stated to be superior to anthracite as a household fuel.

The company have issued circulars giving the results of tests of the fuel which have been made by experts. These tests substantiate the claims made by the inventor. It is claimed that this discovery will enable the vast deposits of anthracite dust, now practically valueless, to be utilized and made into more nearly perfect fuel than anthracite coal alone. The fact that it will also make soft coal waste into hard, smokeless and valuable fuel is also of very great interest. The company offer every facility to those interested in investigating and testing their process. Now that patents have been secured they have no desire to keep the composition of the fuel secret. Henry R. Dorr is president of the company, Charles W. Ward vice-president, and Charles H. Landon secretary and treasurer. Mr. Landon is a member of the firm of W. C. Landon & Co., dealers in builders', saddlery and heavy hardware, &c., at Rutland.

The Dominion Iron & Steel Company's Affairs.

The directors of the Dominion Iron & Steel Company and the Dominion Coal Company met in Montreal on September 1 and agreed to abrogate the lease of the latter company by the former. It is stated that the steel company will be reimbursed for all the money they have paid for improvements for the coal company, amounting to something over $2,000,000, and will also be given a bonus which may amount to over $1,000,000. The shareholders will be asked to meet in two weeks when a plan will be laid before them for ratification. If this money is paid over to the steel company it will enable the improvements which are now under way to be completed without raising additional funds. These consist of a rod mill, structural and plate mills.

The abrogation of the lease discontinues the very favorable arrangement of the steel company for their fuel. The new fuel arrangement proposed is that the steel company are to get a run of mine coal for four years sufficient to run their works at the price they are now paying. At the conclusion of that period they are to get slack coal at the same price if they want to take it.

The Philadelphia Foundrymen's Association.

The one hundred and thirtieth regular meeting of the Philadelphia Foundrymen's Association, the first after the summer recess, was held at the Manufacturers' Club, Broad and Walnut streets, on Wednesday evening, September 2. The following were among those present:

Dr. E. E. Brown, E. E. Brown & Co., Philadelphia.
W. J. Burns, Wm. Wharton, Jr., & Co., Philadelphia.
Dr. Funke, Philadelphia.
M. H. Bickley, Penn Steel Casting & Machine Company, Chester, Pa.
J. N. Ebert, Fred. H. Bateman and W. O. Steel, Bateman Mfg. Company, Grenloch, N. J.
W. L. Tavior, Tioga Foundry Company, Philadelphia.
W. J. Shennen, Bethlehem Steel Company, South Bethlehem, Pa.
Geo. W. Johnston, Ernest Law & Co., Philadelphia.
H. H. Benkert, Williamson Bros. Company, Phildelphia.
M. H. Baskin, Philadelphia.
A. Levy, C. H. Gifford & Co., Philadelphia.
W. A. Perrine and T. J. Kelly, Abram Cox Stove Company, Philadelphia.
J. Parker Jefferis and G. A. Messick, Pusey-Jones Company, Wilmington, Del.
P. D. Wanner, Reading Foundry Company, Reading, Pa.
T. B. Harkins, Harkins Foundry Company, Bristol, Pa.
A. E. Outerbridge, Jr., Wm. Sellers & Co., Philadelphia.
L. B. Eankson, Naval Constructor, U. S. Navy Yard.
H. O. Evans, Thos. Devlin Mfg. Company, Philadelphia.
R. C. Oliphant, Oliphant Steel & Iron Company, Trenton, N. J.
H. L. Haldeman, Pulaski Iron Company, Philadelphia.
Geo. C. Davis, Philadelphia.
J. Hy. Pepper, Philadelphia.
W. H. Ridgway, C. Ridgway & Son Company, Coatesville, Pa.
F. C. Price, E. J. Etting, Philadelphia.

J. S. Hibbs, J. W. Paxson Company, Philadelphia.
J. Thompson, J. Thompson & Co., Philadelphia.
A. A. Miller, *The Iron Age*, Philadelphia.
F. M. Etting, E. J. Etting & Co., Philadelphia.
W. P. Cunningham, A. & P. Roberts Company, Pencoyd, Pa.
Arthur Simonson, Wm. Wharton, Jr., & Co., Philadelphia.
Michael A. Magee, U. S. Navy Yard, Philadelphia.
H. L. Tripple, Standard Scale & Supply Company, Philadelphia.
Howard Evans, J. W. Paxson Company, Philadelphia.

In the absence of the president, the chair was occupied by Dr. E. E. Brown, who called the meeting to order at the usual hour. The treasurer reported a balance of $2114.14 on hand, with all bills paid.

Dr. Brown, chairman of the Committee on Model Foundry for the Louisiana Purchase Exposition, St. Louis, reported that the committee had organized and had had several meetings. They are now awaiting further advices from Dr. Holmes, chief of the Department of Mines and Metallurgy, on receipt of which a definite report can be made.

The paper before the association for the evening was entitled "The Small Converter Process for Making Steel Castings," by Arthur Simonson, Philadelphia, of the Tropenas Steel Process Company. The paper was illustrated with numerous lantern slides and drawings, and was followed by a discussion which brought out the use of aluminum in the process, Mr. Simonson explaining that its use was simply precautionary. On high carbons it was seldom used; for machinery castings, 3 or 4 ounces per ton, and for dynamo work it might reach three or four times that amount.

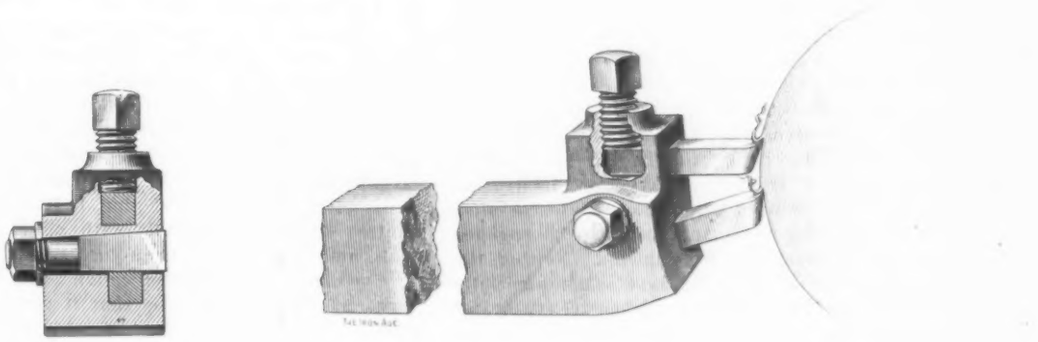
After the discussion a vote of thanks was tendered to Mr. Simonson for his paper, and then the meeting adjourned, after which those present proceeded to the roof garden of the club, where luncheon was served and interesting addresses were made by Dr. Brown, P. D. Wanner, W. A. Perrine and others.

The Bickford Double Tool Holder.

The Bickford Drill & Tool Company of Cincinnati have designed the double tool holder shown in the accompanying drawings. In the sectional view it will be noticed that the lower cutter is held by a tapered plug, operated by a nut at the side of the holder, while the upper cutter is held by the direct pressure of a screw at the top of the holder. The cutters are so inclined as to rest at the same angle—10 degrees—with a radius of the work. This insures the same cutting ability on the part of both tools, a feature of the greatest importance in multiple tool holders, particularly those intended for operation on circular work.

Colorado Fuel & Iron Company.

The reorganized Board of Directors of the Colorado Fuel & Iron Company met in New York on September 2 for the election of officers. As had been expected, F. J. Hearne, the former president of the National Tube Company, was elected chairman of the board and president. The union of these two offices was provided for in a rule adopted at the annual meeting in Denver. J. F. Welborn was elected vice-president and D. C. Beaman re-elected secretary.



THE BICKFORD DOUBLE TOOL HOLDER.

This Executive Committe was appointed: F. J. Hearne, John D. Rockefeller, Jr., Frederick T. Gates, George J. Gould and John C. Osgood.

No statement was made regarding the semiannual dividend on the preferred stock, which is usually paid in August. It is said the Executive Committee has not fully prepared the new financial plan expected. There will be another meeting of the directors at which the matter will be taken up. The new management has virtually promised that all of the improvements undertaken shall be made, and the company's affairs given the most careful and constant attention.

The action just taken marks what seems likely to be the final chapter in a long story of changes in management and conflict of opposing interests in the company. Their affairs will apparently be upon a more permanent basis than in recent years.

Photographs received from the Lookout Mountain Iron Company, Battelle, Ala., set forth the progress of the work of building their furnace plant on August 20, 1903. One of them shows the site of the furnace, with the foundations complete for the stack and partly completed for the stoves and the blowing engines. A great deal of material is on the ground and a large force of workmen is engaged. The second photograph gives a general view of the coke ovens, showing a battery of the ovens completed, and a boiler plant and power house in the immediate vicinity for utilizing the waste heat and gas from the ovens. The third photograph gives a view of the coal tipple at the end of the battery of coke ovens, together wth coal washers and a bin for washed coal.

Wrought Pipe.*

BY FRANKLIN RIFFLE.

Steel Pipe versus Wrought Iron Pipe.—The crowning achievement of the pipe industry has been the successful use of steel in the manufacture of wrought pipe. This innovation, by one of the leading pipe mills in the early eighties, met with a storm of opposition, not only from rival mills, but from engineers as well.

It was represented that a perfect weld could not be made with steel, that steel pipe could not be threaded, and that it was even more unreliable and treacherous when under pressure than cast iron pipe. As late as ten years ago many engineers refused to accept steel pipe as a substitute for wrought iron pipe, although manufacturers were prepared then as now to prove its superiority. Since then engineers have so universally adapted themselves to the new conditions, that when an occasional nonconformist specifies wrought iron pipe in preference to steel, it is assumed that he has not kept pace with the wonderful progress that has been made in the manufacture of steel tubular goods during the last decade. At the present time manufacturers are producing a uniform quality of steel for pipe, that for malleability, ductility and weldability cannot be excelled by the more expensive product of the puddling furnace, while for tensile strength it is vastly superior to the highest grades of iron.

In 1897, Prof. Henry M. Howe, an eminent authority on the metallurgy of steel, made a series of experiments for the purpose of determining the relative bursting strength, tensile strength and frictional resistance of wrought iron and steel pipe. The information derived from these experiments is probably the most reliable and conclusive that has ever been compiled relative to the comparative merits of iron and steel pipe.

Three classes of wrought iron and steel pipe were selected, viz., 2-inch line pipe, 2-inch tubing and 5⅝-inch casing. The wrought iron pipes were obtained from three manufacturers of good reputation, while the steel pipes were provided by the manufacturer who engaged Professor Howe to make the experiments. Neither the wrought iron nor the steel pipes were made especially for these tests. In his report, Professor Howe states that he selected the 2-inch steel tubing from a large pile at the shipping platform of the mill, and the 2-inch steel line pipe from two large piles at the storehouse, each about 12 feet high and 60 pipes wide. The 5⅝-inch steel casing was selected partly from a pile at the shipping platform, partly from another pile at the mill, and partly as it came from the welding rolls. Professor Howe took the additional precaution to mark each pipe selected with his private stamp.

Bursting Tests.—The pipes which were selected for the bursting tests were provided with welded heads, after which they were subjected to hydrostatic pressure until they burst, the bursting pressures being determined by a gauge. The highest pressure available was 6,000 pounds per square inch. All of the wrought iron pipes burst below this pressure, while approximately two-thirds of the 2-inch steel tubing, and one-third of the 2-inch line pipes successfully resisted the maximum pressure.

The following table shows in condensed form the average results of the experiments:

Bursting Tests by Hydrostatic Pressure.

	Bursting pressure. Pounds per square inch.		
	2-inch line pipe.	2-inch tubing.	5⅝-inch casing.
Wrought iron, minimum	1,000	3,300	250
Steel, minimum	2,300	5,150	1,450
Wrought iron, maximum	4,000	5,000	1,400
Steel, maximum	6,000	6,000	2,750
Wrought iron, average of all pipes tested	2,918	4,106	931
Steel, average of all pipes tested	4,733	5,800	2,038

A comparison of the average results shows that the steel pipes excelled the wrought iron pipes by 62 per cent. in the line pipe, 41 per cent. in the tubing, and 119 per cent. in the casing.

Tensile Tests.—For making the tensile tests short pieces were cut from certain of the steel and wrought iron pipes. These were accurately threaded and fitted with special extra heavy couplings. They were then pulled lengthwise in a tensile testing machine until they tore in two. The stress was noted, and reduced to pounds per square inch of metal area. The average results are shown in tabulated form as follows:

Tensile Tests.

	Tensile strength, pounds per square inch of net section.		
	2-inch line pipe.	2-inch tubing.	5⅝-inch casing.
Wrought iron, minimum	43,107	47,244	47,312
Steel, minimum	63,025	60,370	75,931
Wrought iron, maximum	53,809	55,074	61,309
Steel, maximum	67,586	66,495	91,591
Wrought iron, average of all pipes tested	50,002	51,852	54,311
Steel, average of all pipes tested	65,999	63,057	82,355

The table shows that the steel pipes excelled the wrought iron pipes by the following percentages: Line pipe, 32; tubing, 22; casing, 52.

Friction Tests.—Without going into details it may be stated briefly that the friction tests showed that the steel pipes offered less resistance to the flow of water than wrought iron. To quote Professor Howe: "For a given initial pressure the final pressure is here about 6 per cent. greater in case of steel than in that of wrought iron." The concluding sentence of Professor Howe's report relative to the above series of tests is as follows: "To sum up, the steel pipes excel the wrought iron very greatly in bursting strength, very considerably in tensile strength, and somewhat in offering less frictional resistance to the flow of water."

Threading Steel Pipe.—The most common complaint against steel pipe is that it is more difficult to thread than wrought iron. This difficulty can be usually traced to the use of old, worn out threading tools. Steel pipe is well threaded at the various pipe mills, and is equally well threaded in the best pipe fitting shops. In fact, no pipe fitter or pipe layer need have the slightest difficulty with threading steel pipe, if he will take the precaution to provide himself with up to date threading tools, and then keep them in good repair.

Corrosion.—Another objection that is sometimes urged against steel pipe is that it corrodes much more rapidly than wrought iron. Of late years this objection has been shown to be based on prejudice rather than fact. The writer is frequently told that wrought iron pipe is much more durable than steel; but when he attempts to get at the facts his informants invariably fail to furnish any satisfactory evidence in support of their extravagant claims.

As early as 1895, Professor Howe, in a paper entitled "Relative Corrosion of Wrought Iron and Steel," summed up his analysis of a considerable number of experiments made by himself and other investigators in the following language: "It is misleading to say either that normal low carbon steel corrodes more or that it corrodes less than wrought iron, since the irrelative corrosion varies with the inclosing medium. I think we have every strong reason to believe that such steel when carefully made resists corrosion in fresh water as well as wrought iron; in cold sea water, at least nearly as well as wrought iron; and in acidulated water better than wrought iron." Five years later Professor Howe published the results of a series of experiments in which he exposed a number of plates of wrought iron, steel and nickel steel, ⅛ inch thick, to the action of sea water, river water and the weather, for two periods of one year each. The results are summed up in the following table:

Corrosive Tests.

	Sea water.	Fresh water.	Weather.	Average.
Wrought iron	100	100	100	100
Soft steel	114	94	103	103
3 per cent. nickel steel	83	80	67	77
26 per cent. nickel steel	32	32	30	31

This table practically confirms Professor Howe's statement of 1895, and should go far toward convincing any one open to conviction that the difference in the rate of corrosion between iron and steel is hardly appreciable, and that wrought iron possesses no advantage over steel in this respect.

* Abstract of paper read before the Pacific Coast Gas Association, San Francisco, July 21-23.

Protection from Corrosion.—No matter whether we use wrought iron or steel pipe, corrosion is a factor that cannot be ignored. Its rapidity of action depends to a very great extent on the chemical properties of the soil in which the pipe is laid. In some soils of California light riveted pipe coated with asphaltum has done good service as water mains for 25 or 30 years, while in other soils the same classes of pipe have lasted less than as many months. How best to protect iron and steel pipe from corrosion has long been a problem that has given rise to much research and experiment. More than 30 years ago the manufacturers of light riveted pipe in California realized that the success of this class of pipe depended upon the application of a satisfactory preservative coating. Judging from riveted pipes that were recently taken up in Oakland, after having been in the ground since the early seventies, it was customary in those days to apply the asphalt coating very generously and with great care. Since the manufacturers of riveted pipe, refiners of asphaltum, and engineers, have devoted much time and thought to this all important subject, and at the present day the coating of steel pipe with asphaltum is probably better understood in California than anywhere else in the world. It is possible to purchase in this market asphalt preparations for coating pipe that will give excellent results if properly used. And here it should be emphasized that, in coating pipe with asphaltum, experience, good judgment and thoroughness are the prerequisites of success. Probably 90 per cent. of the failures of asphalt coating to preserve pipe from corrosion is due to the absence of one or all of these important qualifications. In view of the importance of the subject the following points are suggested regarding the coating of pipe with asphaltum:

1. The pipe should be thoroughly cleaned. Every particle of rust and as much of the mill scale as possible should be removed.

2. The asphalt bath should be brought to a temperature of 300 degrees F. Its proper consistency may be determined by dipping in the mixture a strip of thin steel and then withdrawing and plunging into cold water. If after this treatment the coating is soft and sticky the mixture contains too large a proportion of the fluxing or liquid grade of asphalt, and if in bending the strip the coating shows a tendency to crack and flake off there is an excess of the solid grade.

3. The pipe should be left in the bath until it has had sufficient time to attain the same temperature as the asphaltum. For the heavy types of welded pipe it would be advisable to heat each pipe to the same temperature as the bath before immersing.

4. As a thick coating of asphaltum affords more thorough protection than a thin coating, two dippings are recommended, in which case the first coating should be allowed to harden before redipping.

5. Pipe should be coated in the vicinity of the laying. Under no circumstances should it be dipped before leaving the mill, except as a precaution against rusting en route, in which case it should be redipped at destination. After the pipes receive their final coat the greatest care should be exercised to prevent abrasion, both in distributing along the trench and in laying. As a final precaution every pipe should be rigidly inspected for abrasions, and wherever exposed the metal should be given two coats of some reputable brand of asphalt paint.

The Erie's Industrial Department.—The Erie Railroad Company have opened an industrial department at 21 Cortlandt street, New York, under the direction of Luis Jackson, industrial commissioner. The purpose of this department is the further development of the territory traversed by the railroad. The company will seek by this means to increase the number of manufacturing plants on their system. Through the bringing of raw material and resources to greater utility and the higher development of the commerce of the territory reached, the prosperity and growth of the towns on their lines will be augmented and the traffic returns of the company be increased. The industrial department will furnish data on raw material, resources and advantages for manufacturing on the Erie system. Maps showing the industrial advantages of the territory are now in the press, and effective measures will constantly be employed to attract the attention of manufacturers to Erie cities. The company's lines traverse the States of New York, New Jersey, Pennsylvania, Ohio, Indiana and Illinois, comprising a territory rich in resources and enterprise. The company have great ore docks at Cleveland and Buffalo, their lines run through the steel manufacturing districts, and many of the most important business centers are immediately upon their tracks. The geographical location of the Erie railroad is such as to form a world's thoroughfare, quickly commanding all markets, domestic and foreign. Mr. Jackson, the industrial commissioner, has had a great deal of experience in this branch of enterprise, having for years been connected with Western railroad systems, conducting similar methods for their benefit.

The Pennsylvania Coal & Coke Company.

Advices from Altoona, Pa., state that the Webster Coal & Coke Company and the Pennsylvania Coal & Coke Company of Philadelphia have consolidated under the name of the Pennsylvania Coal & Coke Company. The Webster Company are probably the largest operating concern in the Central Pennsylvania district, owning 14 mines, all of which are producing coal. The properties include four collieries at Ehrenfeld, one at Cresson, one at Gallitzin, two at Benscreek, one at Nant-Y-Glo, one at Beaverdale, two at Hastings and two at Amsbry, all in Cambria County, and employ 5000 men. The Pennsylvania Coal & Coke Company operate ten collieries, most of which are located at Moss Creek, Cambria County, and Bennington and Tunnell Hill, Blair County, and employ about 5000 men. Besides mines, the Webster people own several electric light plants, water works, large company stores and other investments. Thomas Watkins, vice-president of the Webster Coal & Coke Company, was one of the members of the anthracite Strike Commission.

Pittsburgh Manufacturers at St. Louis Exposition.—A large number of Pittsburgh manufacturing establishments will have complete and costly exhibits at the St. Louis fair next year. Among these are Standard Sanitary Mfg. Company, an artistic and expensive exhibit; Westinghouse Air Brake Company; Standard Oil Company, the most expensive exhibit in its history; Standard Underground Cable Company, underground cables; Star Encaustic Tile Company; Pressed Steel Car Company, five cars and sectional parts of cars; Crucible Steel Company of America; Oil Well Supply Company; Pittsburgh Meter Company; Thomas McKay & Co.; W. W. Patterson Company, blockmakers and blacksmiths; Ruud Mfg. Company, instantaneous gas water heaters.

The Tucker & Dorsey Mfg. Company, Indianapolis, manufacturers of hardware specialties, have turned their large fire cistern into a swimming pool for the employees by putting over the cement floor a false wooden bottom with sloping floor. The natatorium is 41 feet in diameter, with a depth varying from 3½ to 6½ feet. It is equipped with steam pipes, and the temperature can be regulated winter or summer. It is fed from a 300-foot well and supplies the boilers. Thus the water is changing and always fresh. A dressing room and two shower baths have also been put in and turned over to the employees. The bathing hours are before 7, from 12 to 12.45, noon, and from 6 to 7 in the evening. The pool is in the open air, but will be covered for winter use.

Last week a meeting of the Southeastern Railway, Land & Industrial Association was held at Buffalo. This is the first time that a meeting of this association has been held in the North. An effort is to be made to divert some of the migratory movement which is now in progress toward the Canadian Northwest. Twenty Southern railroads were represented by their industrial agents. The meeting is believed to foreshadow a strong movement in the direction of inducing reinforcements to Southern agricultural and industrial population.

Production of Coke in 1902.

A Large Increase Over Any Previous Year.

WASHINGTON, D. C., September 8, 1903.—The production of coke in the United States during the year 1902 exceeded that of any previous year by more than 16 per cent., acording to the annual report of the United States Geological Survey, which has just been completed by Edward W. Parker. What is known as "gas house coke," which is a by-product in the manufacture of illuminating gas, is not considered in this report.

Until 1893 practically all of the coke made in the United States was the product of what is commonly known as the beehive oven. During the last decade, however, there has been a steady and noteworthy development of coke manufacture in retort or by-product ovens, which, if continued, will cause the gradual shifting of the coke making industry from the vicinity of the coal mines to the manufacturing centers, where markets for by-products are available. Although in some instances the coke product from these retort ovens is a secondary and not the primary product, the manufacture of such coke is considered as properly coming within the scope of this investigation.

The coal consumed in the manufacture of coke in the United States is drawn from six of the seven bituminous coal fields—namely: 1. The Appalachian field, embracing the great coking coal regions of Pennsylvania, Virginia, West Virginia, Ohio, Georgia, Alabama, Tennessee and Eastern Kentucky. 2. The Eastern interior field, which includes the coal areas of Illinois, Indiana and Western Kentucky. 3. The Western interior field, embracing the States of Iowa, Kansas, Missouri and Nebraska. 4. The Southwestern field, including Arkansas, the Indian Territory and Texas. 5. The Rocky Mountain field, including Colorado, New Mexico, Utah, Montana, South Dakota and Wyoming. 6. The Pacific Coast field, in which the only coking coals are found in the State of Washington. The coal of the Northern interior field, lying wholly within Michigan, has not so far been used for coke.

A considerable amount of coke is made in States in which there are no coal fields—namely, Massachusetts, New York, New Jersey and Wisconsin. The ovens in Michigan and those under construction in Maryland near Baltimore are, or will be, fed with coal from other States. With the exception of the few beehive ovens in Wisconsin, all of the plants outside of the coking coal fields are retort ovens. The unit of measurement used in this report is uniformly the short ton of 2000 pounds.

Production.

The production of coke in the United States in 1902 amounted to 25,401,730 short tons, as compared with 21,795,883 short tons in 1901. Large as this increase was, it was considerably less than it would have been had the transportation facilities been commensurate with the demand for coke and with the productive capacity of the ovens. During the greater part of the year operators were kept at a disadvantage by the inability of the railroads to supply cars and motive power to handle the output. The condition was particularly evident in the Connellsville region of Pennsylvania, where at times it was necessary to put a number of ovens out of blast on account of the accumulated stocks, which overtaxed the storage capacity at the ovens.

The unprecedented production of coke in 1902 was accompanied by an increase in value which was even more worthy of note. The average price per ton at the ovens was the highest recorded in a period of 23 years, and the total value reached the high figure of $63,339,167, an increase over the preceding year of $18,893,244, or 42.5 per cent. The value of the coal used in the manufacture of coke in 1902 exceeded that of 1901 by $7,922,563, from which it appears that the value of the coke product increased $10,970,681 over and above the increased value of the coal used in its production. Prices for coke during the strike in the anthracite coal fields reached an abnormally high stage, as much as $15 per ton being reported as paid for this fuel at one time. In 1901 the highest price obtained for Connellsville furnace coke was $4.25, which was paid during March and April of that year. In September and October of 1902, while contract coke was nominally quoted at $3 per ton, consumers were paying from $10 to $12 per ton for prompt delivery. With the termination of the anthracite strike in the latter part of October prices for coke quickly declined, but they did not reach the comparatively low level that prevailed in the early part of the year. In December furnace coke for prompt delivery was commanding $5 and $6 per ton, and contracts for delivery in the first six months of 1903 were made at from $3.75 to $4 per ton. These prices showed a decided advance over December, 1901, and January, 1902, when contracts for Connellsville furnace coke were made at $2.25 per ton, coke for prompt delivery bringing $3.50 and $3.75 per ton.

In considering the total value and average price for the entire coke product of the United States as presented in this report, it must be remembered that in many cases the values are arbitrarily fixed. A number of the larger manufacturers operate blast furnaces in connection with their coal mining and coke making business. In such cases the coke product is sometimes charged against the furnace departments at cost, and sometimes at a figure based upon the cost of coal mining and coke making, plus a percentage of profit on these operations. The value is not fixed by the market value. In other cases the value is estimated upon the average prices for coke of a similar quality produced and sold in the immediate vicinity. The H. C. Frick Coke Company of Pittsburgh, the largest single producer of coke in the United States, is now no longer in the market as a seller of coke, its entire product being taken by the United States Steel Corporation, of which the Frick Company is a component part.

During 1902 there were 69,069 coke ovens in existence in the United States, as compared with 63,951 ovens in 1901. Of these 69,069 ovens 1945 were idle throughout the entire year, leaving a total of 67,124 active ovens, which produced an average of 378.4 tons per oven. The total number in 1902 included 1663 by-product recovery ovens, which produced 1,403,588 tons of coke, an average of 844 tons of coke per oven. There were under construction at the close of 1902 8758 new ovens, of which 1346 were of the retort or by-product type. The number of completed retort ovens increased from 1165 in 1901 to 1663 in 1902, and the output of retort oven coke increased during the same period from 1,179,900 tons to 1,403,588 tons.

Counting each bank of ovens as a separate establishment, the returns for 1902 show a total of 456 establishments, as compared with 423 in 1901. Thirty-five establishments, all comparatively unimportant, were idle throughout the year. There were also 29 new establishments whose ovens were not completed at the close of 1902.

Production by States and Territories.

The details of the production of coke in 1902 are presented by States and Territories in the following table:

State or Territory.	Establishments.	Coal used. Short tons.	Coke produced Short tons.	Value of coke per ton
Alabama	37	4,237,491	2,552,246	$3.25
Colorado*	15	1,695,188	1,003,393	2.74
Georgia	2	129,642	82,064	3.643
Indian Territory	4	110,934	49,441	4.10
Kansas	10	35,827	20,902	2.617
Kentucky	7	265,121	126,879	2.505
Maryland	1	.....	.....	....
Missouri	2	10,430	5,780	2.50
Montana	3	99,628	53,463	6.75
New Jersey	1	.....	.....	....
New Mexico	2	40,943	23,296	3.178
Ohio	9	219,401	146,099	3.37
Pennsylvania	196	25,017,326	16,497,910	2.33
Tennessee	15	1,025,864	560,006	2.85
Utah†	2	.....	.....	....
Virginia	14	1,716,110	1,124,572	2.065
Washington	5	68,546	40,305	4.94
West Virginia	120	4,078,579	2,516,505	2.31
Illinois	3			
Indiana	1			
Massachusetts	1			
Michigan	2	852,977	589,869	3.44
New York	2			
Wisconsin	1			
Wyoming	1			
Totals	456	39,604,007	25,401,730	$2.49

* Includes the production of Utah.
† Included with Colorado.

The earliest record of coke production in the United States was that made during the census year of 1880. In that year the total production amounted to 3,338,300 short tons. Previous to this most of the iron manufactured in the United States had been made with the use of anthracite coal. Since 1880 the increase in production and use of coke has rapidly supplanted the use of anthracite coal for iron making, and now little of our large iron tonnage is produced in anthracite furnaces. A comprehensive idea of the growth of the coking industry in the United States is obtained by dividing the history of the last 20 years into five year periods. The average production for the three years, 1880 to 1882, was about 4,000,000 tons a year. In the five years from 1883 to 1887, inclusive, the average production amounted to 5,980,459 short tons. The average for the next five years, from 1888 to 1892, was nearly double that of the preceding five years, amounting to 10,533,918 tons. This period was followed by the panic years of 1893, 1894 and 1895, and the coke production showed only a small increase in the next five years, averaging during that time 11,418,536 tons per year. The return of prosperous conditions, which began in 1896, has shown no decided setback since that time, and the production of coke during the five years from 1898 to 1902, inclusive, obtained an average of 20,689,347 tons, and exceeded for the first time a total of 25,000,000 tons in 1902.

The 456 establishments which were in existence on December 31, 1902, included 29, with a total of 4878 ovens, which were not entirely completed before the close of the year and did not contribute to the production in 1902. There were also 35 establishments, having a total of 1539 ovens, whose ovens were not operated at all during the entire year. Tnese idle plants were all comparatively small, averaging only 44 ovens to the establishment.

The Industry in Pennsylvania

In view of the fact that approximately two-thirds of the entire coke product of the United States is made in Pennsylvania, some of the details of the industry in that State will be of interest. Sixty per cent. of Pennsylvania's product, or 40 per cent. of the entire output of the United States, is from the famous Connellsville region. In 1902 the coke production of Pennsylvania amounted to 16,497,910 short tons, out of a total for the United States of 25,401,730 tons. In 1901 Pennsylvania produced 14,355,917 tons, out of a total of 21,795,883. Of these totals, the Connellsville region produced in 1901, 10,235,943 tons, and in 1902, 10,418,366 tons. To this production of the Connellsville region might be reasonably added the output of the recently developed areas in the vicinity of Uniontown, which have been classified in this report under the name of the Lower Connellsville district. This new district produced in 1901, 1,116,379 short tons, and in 1902, 1,899,111 tons, making the total for the two districts in 1901, 11,352,322, and in 1902, 12,317,477 short tons.

There were in 1902 196 establishments in the State, as compared with 188 in 1901. Four of the eight new plants were constructed in the Lower Connellsville district, the most recently developed coking field in the State, the total number of completed ovens increasing from 34,906 to 90,609. Of this increase 1002 were in the Lower Connellsville district. There were building at the close of 1902 2332 new ovens, as compared with 832 ovens in the course of construction at the close of 1901. The completed ovens at the close of 1902 included 507 Otto-Hoffman, 75 Semet-Solvay and eight Newton-Chambers by-product ovens. Of the 2332 ovens building at the close of 1902 there were 100 Otto-Hoffman, 100 Semet-Solvay and 212 Schniewind by-product ovens. Including the ovens which were completed in 1902, but not completed in time to be put in blast during that year, there were nine establishments in the State, with a total of 599 ovens, which did not produce any coke throughout the entire year.

Coke Making in By-Product Ovens.

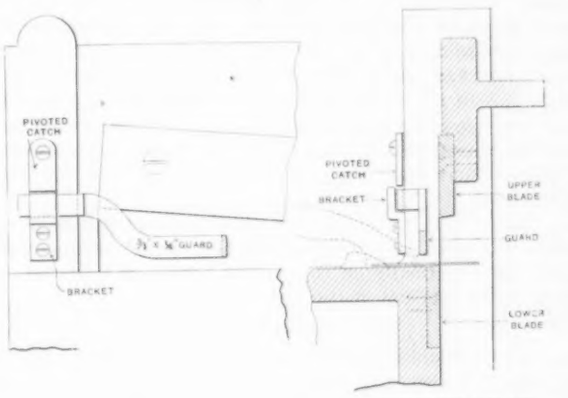
The retort or by-product method of coke making in the United States continues to show encouraging progress. This is principally evident in the number of new plants which have been reported as in course of construction at the close of the last three years. It should be remembered that the construction of one of these plants involves a much larger expenditure of capital and consumes a much longer time in the actual building than is necessary for the completion of a beehive oven plant. The close of 1902 marks the completion of the first decade of the use of by-product ovens in the United States, the first plant having been constructed at Syracuse, N. Y., in 1893. This plant, which was largely experimental, consisted of but 12 ovens. At the close of 1902 there had been completed a total of 1663 by-product ovens, and 1346 ovens were in course of construction.

The statistics gathered by the survey show that at the close of 1900 there were 1096 ovens building, of which barely 50 per cent. had been completed at the end of 1902, showing an average of more than two years consumed in the building of these plants. The amount of coke produced in by-product ovens in 1902 amounted to 1,403,588 short tons, or 5.52 per cent. of the total product, as against 1,179,900 tons, or 5.44 per cent. of the total, in 1901. The average annual production of by-product ovens amounted to about 1000 tons of coke each, while the highest average attained for each beehive oven in any year was made in 1902, when it reached 366.6 tons.

W. L. C.

The Mullins Guard for Squaring Shears.

The guard designed by W. H. Mullins of Salem, Ohio, is a very simple device, which in no way interferes with



THE MULLINS GUARD FOR SQUARING SHEARS.

the operation of shears for squaring sheets, and yet makes it impossible for the attendant to get his fingers under the blade. Extending across the front of the shears is a metal guard carried by brackets secured to the frame. The guard is placed at such a hight as to freely admit the work, but is too low to permit the fingers entering. The drawings show the form and method of applying the guard.

The Iowa State College, Ames, Iowa, has instituted a department of farm mechanics, placing in charge C. J. Zintheo, who for a number of years has been employed with the McCormick and Deering Harvester companies, and is familiar with all kinds of machinery. Instruction will be given in farm machinery and appliances, including land drainage, rural telephones, farm water supply and the various means of obtaining power for operating farm machinery, such as electric motors, gasoline and steam engines, water and wind power. The new branch of the college will occupy a three-story fire proof building, 60 x 100 feet, which is now in course of construction.

The steel makers of Germany are reported to have reached an agreement not to sell partly finished goods abroad below certain prices. The details of the agreement are kept secret, but the object is both to obtain better returns for the product and to preclude German finished goods coming into competition abroad with foreign work manufactured from German material exported at lower prices than those at which it is sold at home.

Notes from Great Britain.

The Markets.

LONDON, August 29, 1903.—With the close of August exit holiday lethargy. The result is already being felt in a better tone prevailing in one or two of the iron and steel departments. Manufacturers are not happy, and are still troubled with foreign competition, but customers are showing less reserve in covering their requirements. This is particularly noticeable in regard to pig iron. After being rather stagnant for some weeks, demand for forge iron has freshened up considerably, and some fairly substantial sales have been made, with the result that quotations are firmer all round, while for one or two makes an actual advance on recent quotations has been secured. Northamptonshire and Derbyshire forge pigs, for instance, were quite 6 pence dearer yesterday than a week ago, and consumers were less unwilling to buy at the improved price. This fact, of course, indicates slightly increased activity in finished iron, but it is probably also due as much to the fact that during the time they have been holding off the market ironmasters have worked off both stocks and contracts, and are now under an absolute necessity to buy.

Finished iron makers still complain that the cost of pig iron is out of proportion to that of finished iron. The argument is admitted, but it is pointed out that the root of the difficuly is to be found in the continued dearness of fuel, which prevents smelters from giving the desired relief. The demand for marked bars remains steady, if quiet. It is mainly on home account, very little being sold for export. Rather more is being done in unmarked bars. This branch of the trade has been exceptionally depressed during the holiday season, but now consumers, though still indisposed to contract ahead for any length of time, are buying much more freely. Prices are not being improved, but manufacturers are rather more cheerful now that their mills are promised more active employment.

It is freely rumored that German steel billets have been increased in price to £4 12s. 6d., which means that they are practically off the market. This, it is stated, is due to the renewal of the German pool.

Starting in England.

E. D. Cleghorn, managing director of the Acme Lathe & Products Company, Limited, has signed a contract for a site at Trafford Park, Manchester, on which his company propose to erect works for the manufacture of their special machine tools, which have hitherto been made in the United States and imported. The English company have taken over the patent rights for Great Britain. The building will be commenced within the next fortnight, and is to be ready for occupation by the end of the year.

The Economic Condition of Japan.

An exceptionally interesting report by Mr. Parlett on the trade of Japan for 1902 is worth the careful attention of American exporters to the Flowery Land. The total volume of the imports and exports last year was $270,631,000, of which $138,690,000 was the value of imports and $131,941,000 that of exports. These figures show an increase of $8,123,000 in imports, and $3,038,000 in exports, as compared with 1901, the figures of which were the highest up to then. The figures for 1902 are all the more remarkable that there were certain untoward circumstances during the year, for the grain harvests were bad owing to unseasonable weather, and the fall in silver greatly impeded the important trade with China. On the other hand, the silk crop was abundant; and the export trade in raw silk reached a hight of prosperity hitherto unknown, and led to an influx of specie which removed any danger to the system of convertible notes. During the whole year the import of bullion was continuous, and was always in excess of the export, especially in the last three months of the year.

At present the national debt amounts to 552,000,000 yen, of which 190,000,000 are due in Great Britain, and the rest in Japan itself. Ten years ago the debt was 240,000,000 yen, and in the meantime the China war indemnity of 370,000,000 has been paid and absorbed. The ordinary revenue has increased from less than 86,000,000 to over 226,000,000 yen; in other words, while the debt has increased 130 per cent., the revenue has increased 163 per cent.

Of the imports raw cotton was over £8,000,000; cotton goods, £1,750,000; metals, nearly £2,000,000; woolen goods, over £1,000,000; machinery and instruments, nearly £1,250,000; sugar, nearly £1,500,000; kerosene, over £1,500,000; rice, over £1,750,000, and oil cake, over £1,000,000; while in exports raw silk amounted to nearly £8,500,000; tea, to over £1,000,000; silk goods, to over £3,000,000; cotton yarn, to over £2,000,000, and other manufactured goods, of which matches, mats, straw plaits, porcelain, cigarettes and cotton goods were the chief, to over £4,000,000. The coal exported was valued at just over £1,750,000, and the copper to over £1,000,000. Of the imports of raw cotton very nearly half is from British India, while China and Korea take the whole of the exported cotton yarns.

The total trade of the British Empire with Japan last year amounted to £16,250,000, or about 30 per cent. of the whole; the proportion of imports being rather less than 40 per cent., and of the exports about 20 per cent. The share of the United States was about 24 per cent., of China rather more than 15, and of Germany and France at about 6 per cent. each. Trade with India is growing and now, owing to the large imports of raw cotton, nearly equals that with Great Britain, the figures being: Great Britain, $34,560,000 (imports to Japan, $25,706,000); India, $27,751,000 (imports to Japan, $25,164,000).

The Government iron foundry at Wakamatsu, after costing over £2,000,000, has not proved successful, and will require a further heavy expenditure, the original estimate having been $2,000,000. A committee of inquiry into the matter recommends the Government to transfer the enterprise to a private company, free of all cost, and to guarantee interest on the capital of the latter.

Last year shipping to the extent of over 11,500,000 tons entered the Japanese open ports; of this the British ships amounted to 4,155,789 tons, Japanese 4,372,572 tons (counting only Japanese vessels engaged in foreign trade), and German 1,220,297 tons. In 1898, out of a little over 8,000,000 tons, over 4,000,000 were British, over 2,000,000 Japanese and 696,497 German.

Belleville Boilers and the Naval Maneuvers.

In view of the recent controversy as to efficiency of Belleville boilers, some interesting facts are brought to light as to their value by a correspondent who was present at the maneuvers. He says that no fewer than 21 battle ships and large cruisers which took part in these operations depended for their steam supply on these French generators. During the stay of the combined fleet at Lagos, he took special pains to enquire how they had come out of the most severe test to which so large a collection of men of war has ever been submitted. As has been already reported, the fleet was not without its "lame ducks," and the Blake's Scotch boilers in particular were the cause of a most deplorable loss of life; but although the 21 Belleville ships covered over 2000 miles each, and many of them considerably more, he could not learn that in a single instance the boilers had developed defects worthy of mention. None of these ships were compelled to drop out of the maneuvers, even temporarily, by reason of trouble with their boilers. In view of the alarming statements which have been made from time to time this assurance may be accepted by the nation with a feeling of relief.

These ships are not "lame ducks," as has been repeatedly represented. On the contrary, they have shown themselves to be good, reliable steamers, far superior to ships fitted with the older type of generator, and possessing the great militant quality that they are able to put on their full speed at short notice. The "Good Hope" increased her steaming from 9 to 19 knots in less than ten minutes, and in a very short time she was traveling at 22½ knots, maintaining this rate with perfect ease for four hours. The secret of success in working this new kind of boiler lies in the intimate knowledge by the engineers and the staff of its peculiar qualities. It is undoubtedly a type which needs careful handling and much attention and unremitting vigilance. Where these conditions are fulfilled it does well.

The New Russian Duties on Iron and Steel.

The principal increases in the new Russian tariff are those which affect imports into Russia through the seaports, that is to say, from Great Britain and other countries, excepting Germany, while the imports overland—that is, mainly from Germany, are proposed to be subject to duties, which are 20 per cent. higher than the duties from sea borne goods.

The tariff for hoop iron and iron and steel rails reaching Russia by sea is to be increased from 50 copecks per pood of 36 pounds to 90 copecks; sheet iron up to ½ mm. in thickness is to be advanced from 65 copecks to 1 rouble 27½ copecks, and sheets exceeding that thickness from 80 copecks to 1 rouble 50 copecks; steel sheets up to No. 25 (Birmingham standard) rise from 65 copecks to 1 rouble 27½ copecks, and over that gauge from 80 copecks to 1 rouble 50 copecks. In addition to these, the tariff provides for an advance from 1 rouble 40 copecks to 2 roubles 55 copecks per pood in the case of nails, boilers, reservoirs, bridges and pipes; from 3 roubles 20 copecks to 6 roubles for wire manufactures; from a range of 2 roubles to 6 roubles up to 6 roubles 70 copecks for electric cables; from 1 rouble 40 copecks to 8 roubles 50 copecks for dynamos; from 13 roubles 60 copecks to 24 roubles for cutlery, and from 1 rouble 10 copecks to 3 roubles for scythes and sickles.

Perhaps the single exception to an increase is the duty on portable engines combined with threshing machinery, which is to be reduced from 1 rouble 20 copecks to 75 copecks; but the rate for other agricultural machinery and implements is advanced from 50 copecks to 1 rouble 5 copecks. The duty on steam engines, locomotives and printing and lithographic machinery, which at present ranges from 1 rouble 40 copecks to 1 rouble 80 copecks, is increased to 3 roubles 65 copecks, and that on other machinery (including machine tools) and parts of machines made of iron and steel, is advanced from 1 rouble 40 copecks to 4 roubles 65 copecks per pood.

If the new tariff will prove highly detrimental to the British export trade in iron and steel and machinery, it will be even more injurious to German competitors, who are confronted with the possibility of the imposition of a duty 20 per cent. higher for their land transported goods, providing, of course, that new commercial treaties are concluded on the basis of this tariff, although this is somewhat problematical. However, the Germans are of opinion that, if enforced, the new tariff would terminate the export trade of Upper Silesia with Russia, and that the result of the preferential treatment of sea borne imports would be to promote the trade of England and the United States in machine tools, light rolled iron and steel productions, &c., and to some extent favor the export trade of France and Belgium.

S. G. H.

Development of Indiana Water Power.

Manufacturers of Indiana are watching with interest the development of the power plant of the Noblesville Hydraulic Company, Noblesville, Ind. It is one of the first enterprises of the kind on the smaller streams of the State. An old mill dam 5 miles north of Noblesville, on White River, successfully furnished power for a grist mill, and later a woolen mill for about 60 years, and suggested the more modern harnessing of the water. A survey showed that the fall was greatest, 8 feet, at a point 2 miles above Noblesville, and this was selected as the location for a gravity dam of the Beardsley design. It is 300 feet long, 86 feet at the base, built on a blue clay foundation of heavy oak timbers, with concrete abutments and piers, and has a hight of 19 feet. It is calculated to bring the water for 5 miles back to the level of the old mill dam. The land that it will flood, about 160 acres, has been acquired by the company. The water power is to operate six turbines of 350 horse-power each. The plant will cost about $100,000. It will furnish power to many of the manufacturing industries of the city and light for public and private use.

The importance of the experiment is in the demonstration of the water power value of the smaller streams, and its success promises to be followed by trials elsewhere to develop 100 to 500 horse-power for the maintenance of factories, which can be operated so much more cheaply by electrical power than by steam. The Leffler Wheel Company, Springfield, Ohio, secured the contract for the turbines at $14,500; the National Electric Company of New York the two generators and dynamos at $18,500. The company expect to operate the plant by water ten months in the year, and will use steam in January and February when the river usually freezes. The flood gates for use in the spring freshets have a capacity of 640,000 gallons a minute.

The Australian Transcontinental Railroad.

MELBOURNE, August 9, 1903.—The transcontinental railroad scheme for a road from Adelaide to Western Australia has advanced another step. The engineers appointed to report on the project have duly handed in their report, giving estimated costs and revenues, but certainly do not enthuse over the prospects, commercially considered. Rather have they diplomatically evaded this question of advisability of construction by pointing out that it is for the Federal Government to consider whether future possibilities of development may tend to outweigh considerations of the heavy immediate pecuniary loss. Your correspondent from the first has had no faith in the scheme and now pigeon holes it for another five years at the very least. At present rates of Australian progression, it would be safe to pigeon hole it for 25 years, but things move rapidly nowadays, and the writer looks to see Australian policy undergo a rapid and early change in various ways. Before closing this notice of a railway which at present isn't wanted, and wouldn't pay if it were built, it may be of interest to quote the engineers' estimates of costs and revenue, the latter, in the writer's opinion, being excessive:

Clearing, fencing, rails, sleepers, ballasting, rolling stock, &c.	£3,709,954
Engineering surveys	222,597
Eucla Branch (55 miles)	165,000
Contingencies, 7¼ per cent. (no allowance for extraordinary rise in price of rails)	307,316
Interest for one year at 3½ per cent	154,170
Total	£4,559,038
Revenue on opening of line	£205,860
Working expenses	£114,400
Interest at 3½ per cent	159,566
	£273,966
Estimated revenue	205,860
Deficiency	£68,106

The Fort Pitt Bridge Company of Pittsburgh have commenced suit against the Citizens' Traction Company of Franklin and Oil City, to recover $62,321, which the plaintiffs say is due for erecting the Big Rock and Reno bridges over the Allegheny River. Of this amount, it is alleged that $41,627 is due on the contract, and the remainder is on account of delay caused the bridge company by the failure of the defendants to secure the necessary rights of way.

It is proposed to hold an international exhibition at Manchester, England, in 1905, the scope of which will comprise "all that is best in industries, arts and sciences, home, colonial and foreign." The classification will not be too general in the industrial section, but due regard will be given to the products of the district, and imported articles which are required and used there.

The site of the old rolling mill at Indianapolis, 16 acres, has been purchased by a group of capitalists, headed by Crawford Fairbanks, Terre Haute, Ind., and will be used for warehouse and factory sites. There is a brick building of the old Premier Steel Company on the land, 200 x 400 feet, and some smaller buildings.

D. H. McAbee, State Factory Inspector of Indiana, was elected president of the International Association of Factory Inspectors at the recent annual meeting at Montreal, Canada, and D. F. Spees, Chief Deputy Inspector for Indiana, was elected secretary. Next year's meeting will be held in St. Louis.

Lake Iron Ore Matters.

DULUTH, MINN., September 5, 1903.—August shipments of iron ore through the Sault canals, that is, out of Lake Superior, amounted to 3,383,100 gross tons. Shipments from Minnesota ports for the month were 2,496,000 tons, of which the Duluth, Missabe & Northern Road moved 1,020,000 tons, which is a record breaking figure for any month.

General August traffic of Lake Superior again broke records, with a total tonnage of 5,403,808 net tons. Of this 4,241,000 tons were East bound. Of the East bound the bulk was, ore, 3,789,082 net tons. There were 1,153,068 tons of coal, West bound copper shipments were but 15,324 tons, considerably less than the average. For the year to September 1 total Lake Superior traffic has been 22,629,170 tons, compared with 21,639,390 for the corresponding period the year before.

Another record of considerable interest was made this week in ore loading, the steamer "Hoyt" of the Provident Steamship Company having taken 5376 gross tons of ore at the Great Northern docks in exactly 30½ minutes. This is the best time ever made at an ore dock on the lakes, and doubtless anywhere in the world. The "Hoyt" is spaced with hatches every 12 feet, the same as the spacing of dock spouts, so that not so much shifting of the ship was required as when the hatches are 24 feet centers, as is customary.

Improvements by the Steel Corporation.

Arrangements are made for erection at the new B shaft, Pioneer mine, of a splendid steel shaft house to be 168 feet high, to have two compartments and a ladder way. Five-ton skips will be hung, and engines to hoist them at the rate of 2000 feet a minute are to be provided. The shaft is now 1068 feet deep, and two levels are to be opened into ore at once, so that shipments another year will be very large. This shaft was made necessary by the vastly increased tonnage shown in the mine, and by the fact that A shaft will some time probably cave near the surface, requiring the same treatment that was given to No. 1 Chandler, close by. B shaft is in rock its entire depth, and some distance back from ore, while A was sunk by the former owners on the hanging and too close to ore. Two 26 x 60 automatic hoisting engines with 12 feet direct motion drums supplied from 450 horse-power of tubular boilers will provide power. Engine and boiler houses are under way, and the foundations for the shaft house are finished. This mine is hoisting from its single two-compartment shaft 75,000 tons of ore a month, a record that is probably exceeded at very few points. Its shipments for the season to September 1 have been in the neighborhood of 423,000 tons.

The next big steel shaft house to be erected by the Oliver Iron Mining Company will be at Norrie A shaft, which is similar in most respects to that at Pioneer. At Norrie the new shaft is about 900 feet deep, and is built with steel sets and wood lath, except for the portion above ledge, which is 20 feet long and is timbered in the customary way. At Pioneer, wire rope is used for lath for some distance where the surrounding rocks are dense. The Norrie A is 6 x 23 feet inside timbers, carrying four compartments, and is at an incline of 58 degrees. The Norrie house will not be as elaborate as that at Pioneer or others at Ely.

Head frames of the same general nature will be built at Chapin's new steel lined shaft, under construction now at Aragon and at Zenith, it being the policy of the Steel Corporation to provide their important deep mines and large producers with equipment to carry on the largest possible business at minimum costs.

At Adams mine, Mesaba range, they have completed and are now using a milling pit situated 500 feet from No. 4 shaft and hoisting through it. Electric trolleys are used for tramming to the shaft. The pit was excavated by the company and work commenced last winter. About 200,000 yards of material have been removed. The pit is up to 65 feet in thickness of overburden, and the material removed was of an extremely difficult character, cemented hardpan and interbedded boulders. This mine is making an immense output the present year.

Diminishing Activity.

At the Corrigan mines of the Mesaba operations are less active than was planned at the beginning of the year. In all about 1,100,000 tons have been moved forward, and 500,000 tons more will be shipped. Stevenson, their largest mine, has put out 800,000 tons. Most shippers are of the same mind as this party and want to go a little slow until the situation has cleared a trifle.

Cancellations of steel orders have been much less than was at one time feared by mining companies, and they regard the outlook with more satisfaction than for some little time.

A. F. Maitland of Negaunee has been made manager of the Consumers' Ore Company, the new Hanna organization on the Mesaba range. He will open for the company a mine on the southwest corner of section 21, T. 58, R. 19, which is on State land. This property will be a shipper the coming year. It contains a considerable tonnage of good ore. Two other small properties in the same township are to be operated by this company, who have ore lands on several lake ranges and are exploring on the Canadian side of the line.

Recent action by the Oliver Iron Mining Company in dropping options and explorations on the Menominee range was but a forerunner of similar action elsewhere. The company have within a day or two served notice on nearly all owners of land they are exploring on the Mesaba range that they will terminate the options and cease work shortly. It is said at the offices of this and the Minnesota Iron Company that they will have two or three explorations under way on the Mesaba range after 60 days from this date. It is understood that the companies have decided that, for a time at least, they will take no further explorations. They have a good deal of ore, and if they buy more, will negotiate for explored ore deposits rather than explore for their own account. This will tend to diminish materially the number of drills on the Mesaba and other ranges, for the Steel Corporation's companies have been very active everywhere. This is not the first time the Steel Corporation have dropped exploratory work on the Mesaba range, but they have usually in the past renewed their operations as heavily as before within a comparatively brief period.

Iron Belt mine, Gogebic range, has ceased operations for all time and is to be dismantled. It has been a shipper since 1888 and has sent down 1,100,000 tons. Brotherton, Sunday Lake and Chief mines, at Wakefield, are shipping about as in preceding years, and all are being developed to greater depth. No. 2 shaft, Brotherton, is down 680 feet and is to be 100 feet more at once. Sunday Lake is also going down. Stock piles of last winter are going forward at the rate of 2000 tons daily. At Ashland mine they are shipping at the rate of 400,000 tons for the season. Gogebic shipments, as a rule, have been light this year and many stock piles are yet untouched. Oglebay, Norton & Co. and associates will reopen old Metoer, which was abandoned a short time ago, and are now pumping it out.

On the Menominee range the Oliver Iron Mining Company have decided, it is said, to mine what is in sight at Michigan, and then, if explorations underground in the meantime do not show ore, to abandon it finally. At Gibson the company will pump out the recent inflow of water and drive a cross cut to see what may be below. Old Armenia, where it has been supposed that mining was to cease for the present, it is still under way, and drilling is in progress to determine the proper point for additional work. The Scott Iron Mining Company have been formed at Iron Mountain to explore a part of section 10-40-30, where two old shafts are in ore. At new Calumet shaft, near Metropolitan, fine ore has been cut, but its extent is unknown yet. Machinery has been ordered for exploitations at Beta shaft, under way for the Pewabic Company. This machinery includes an 18-drill compressor. At Forest mine they have excellent indications of ore and are stock piling from their original lens.

A Copper Item

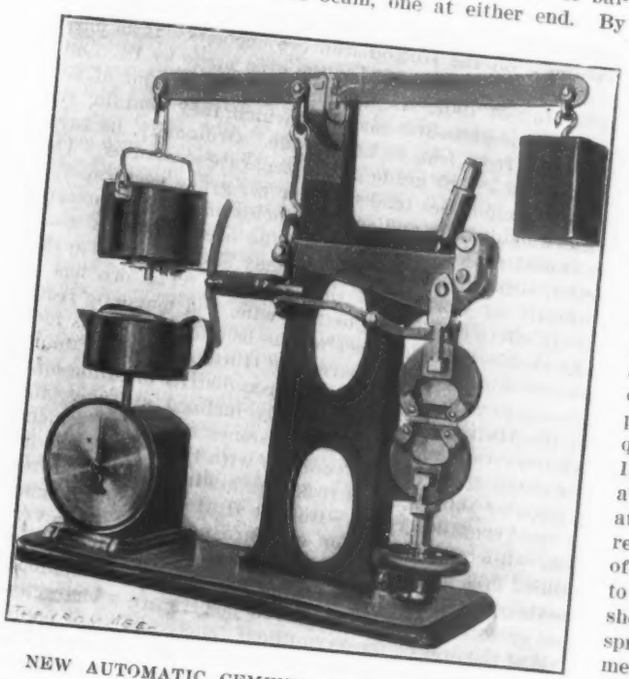
August product of the two 300-ton furnaces of Calumet & Arizona Copper Company was 2,800,000 pounds of metal, which is at the rate of more than 31,000,000 pounds per annum.

D. E. W.

New Automatic Cement Testing Machine.

The Falkenau-Sinclair Machine Company, 109 North Twenty-second street, Philadelphia, are introducing a new automatic cement testing machine. Ever since cement has been tested for its physical properties the importance of having an automatic machine for the purpose has been recognized. The Michaelis machine was one of the pioneers in this field, and it, and machines following its general type, are those in general use to-day. The machine here illustrated is to a certain extent of the same type as the Michaelis machine, but it has the important distinction that the manner of using the shot is reversed, as will appear below. There are certain disadvantages and inaccuracies which are inseparable from machines of this type, but most of these have been eliminated in the machine shown.

Briefly, the principle of this new machine is to balance two weights on the beam, one at either end. By



NEW AUTOMATIC CEMENT TESTING MACHINE.

removing one weight gradually, the other, through the lever system, applies a constantly increasing load on the specimen until it breaks. The removal of the weight is automatically stopped at the instant the specimen breaks. The load which broke the specimen is then obtained by weighing on scales provided for this purpose the weight removed. The removable weight consists of shot and the scales used are preferably a spring balance, whose readings represent the load on the briquette. Beam scales, however, can be used if desired.

In the machine illustrated 15 pounds of shot are sufficient to apply 1000 pounds strain on the briquette. While water and perhaps other materials have been used, it has been found, on the whole, that for practical purposes lead shot is the most universally successful medium for applying the load. One of the principal features of this machine is the application of the load smoothly by allowing another load on the opposite end of the lever to run off; in other words, while in the Michaelis type of machine the load is applied by running shot into the receptacle on the beam, in this machine the load is applied by running it out of the receptacle. The counterweight on the end of the lever, to the right in the cut, is the weight that applies the load, and the receptacle at the other end of the beam holds the shot. If the shot is allowed to escape from the receptacle the same proportionate amount of the weight at the other end of the beam will come into action in producing stress on the briquette. It is evident, therefore, that if the stream of shot which is escaping from the receptacle can be shut off the instant the briquette breaks, the weight of all the shot which has escaped from the receptacle at that instant has aided in breaking the briquette, and therefore the entire amount of the escaped shot should be weighed in order to give the amount of weight acting on the briquette.

In the Michaelis and other shot machines this is not true, for there is a column of shot falling through the air, extending from the nozzle of the receptacle to the pan, which has had no effect in breaking the briquette, but, notwithstanding, is caught in the pan and weighed. This error in the old machines is self evident and need not be elaborated on.

There is another source of error which, although perhaps small, should be eliminated if possible. This is the impact of the shot on the briquette. In the new machine it is seen that this impact is not transmitted to the briquette, for as the falling shot escapes from the beam the load at the other end is applied with absolute smoothness. These are two of the main advantages found in the new machine, and there are certain other advantages in the design which are, perhaps, less evident, but are none the less real. One of these is the improved form of "shut off," which cuts off the escaping stream of shot practically at the instant the briquette breaks. Another is that the grip and entire apparatus is so rigid and free from deflection under maximum load that a very small travel of the weight on the end of the lever develops the full capacity of the machine. The necessity, therefore, of taking a second hitch on the briquette, or putting on additional weights, or any other device of that nature, is avoided and the test is automatic from start to finish.

In order to facilitate operations in the field or in very busy laboratories the builders furnish a spring balance for weighing the shot. The dial on this balance is graduated up to 1000 pounds, which is the capacity of the machine, and the pointer gives the reading of the load applied to the briquette, so that there is no calculation required and no further manipulation to get the weight. In other words, the instant the briquette breaks the operator glances at the pointer on the dial and reads the load at which the briquette broke. The spring balance can be replaced by lever scales, if so desired, but only at the cost of retarding the operation, as it would then be necessary to move a poise out on a beam or apply weights until the shot which had fallen into the pan was weighed. The spring has an adjusting nut, so that should any adjustment be necessary it is readily made.

The History of Babbitt Metal.

An erroneous idea appears to prevail in regard to the invention of Babbitt metal, says the *Metal Industry*. Although Isaac Babbitt was the inventor of the method of using soft metals in journal boxes, his patent specification makes no claim on the alloy itself, but simply on the method of holding the soft metal in place.

Isaac Babbitt was born in Taunton, Mass., on July 26, 1779. He learned the trade of goldsmith, and in 1824, in his native town, made the first britannia ware produced in the United States, but this enterprise proved unsuccessful. He then removed to Boston and entered the employ of the South Boston Iron Works, and in 1839, while an employee of this establishment, he produced the invention which has perpetuated his name. For this invention he was given a gold medal from the Massachusetts Charitable Mechanics' Association, and afterward Congress granted him the sum of $20,000 as a reward. In 1844 the invention was patented in England and in 1847 in Russia. After devoting some time to the production of metals he engaged in the manufacture of soap, so that his name has become almost a household word. He died insane at the McLean Asylum, Somerville, Mass., on May 26, 1862.

The fact that in the patent specification no claim is made for the alloy is sufficient to dispel the ordinary belief in this direction. Britannia metal, pewter or an alloy of tin, 50 parts; antimony, 5 parts, and copper 1 part are recommended. The latter alloy is somewhat softer than that now known as "genuine Babbitt," which is commonly composed of tin, 96 parts; antimony, 8 parts, and copper, 4 parts. The original idea in the use of a soft metal was practically the same as it is now—*i. e.*, to make a bearing which would conform to the surface of the axle.

It is natural, then, that the alloys used to-day are somewhat harder than the original material employed. It is also natural that the same Isaac Babbitt should have been handed down to posterity as the inventor of the alloy, although, of course, quite erroneously.

Canadian Notes.

Ontario's Mineral Production.

TORONTO, September 5, 1903.—The Twelfth Report of the Ontario Bureau of Mines has just appeared. It covers the calendar year 1902. According to its statistics the total value of the mineral production of the Province in that year was $13,391,634. In the metallic list the most important outputs were those of nickel, pig iron, steel, copper and iron ore. The values of these items were as follows:

Nickel	$2,210,961
Pig iron	1,683,051
Steel	1,610,031
Copper	680,283
Iron ore	518,445

The director of the bureau remarks that the activity in exploring for iron noted in last year's report continues without abatement. Some disappointment, he says, has been expressed that up to the present comparatively few deposits of workable ore have been found in the iron ranges of Northern and Northwestern Ontario, the ascertained extent of which is very great. He continues:

Allowance must, however, be made for the difficulties of exploring in the rough country through which the ranges run and the obstacles interposed by the covering of soil and timber. In addition to this, experience on the analogous ranges south of Lake Superior shows that large surface outcropping of ore will be of infrequent occurrence and that for the most part prospecting must be carried on by the diamond drill. The iron formations in the Michipicoten region have, perhaps, been more carefully and systematically explored than in any other district, and several bodies of hematite in addition to the Helen mine have been located, notably those at the Josephine location and Brant Lake. American capitalists have for considerably over a year been prospecting for iron ore on the shores of Steep Rock Lake, on the line of the Canadian Northern, where numerous boulders of first-rate hematite occur, and, though borings have given encouraging indications, no important body of ore appears to have yet been struck. Messrs. Hill of Port Arthur and Williams of Knipton have been conducting explorations in the neighborhood of Arrow Lake, on the Port Arthur, Duluth & Western Railway, where the Mesaba iron formation extends from Minnesota into Ontario. Here they have acquired the old Paulison locations, laid out many years ago, and have been testing them with the diamond drill.

Pig Iron Product and Steel Plants.

In 1902 there were 92,883 tons of domestic ore smelted in Ontario, as against 109,109 tons in 1901, and 94,079 tons of imported ore as against 85,401 tons in 1901. The total output was 112,687 short tons of pig iron in 1902, as against 116,370 tons in 1901. For this reduction in output the scarcity in the supply of coke is the cause assigned. The steel output for Ontario in 1902 was 68,802 tons, as against 14,471 tons in 1901. Speaking of the steel plants of the Province, the report says:

The steel making department of the Hamilton works is being enlarged by the addition of a new 35-ton open hearth furnace, which will about double the capacity for producing steel. This furnace should have an output of about 90 tons per day, and is being built by Alex. Laughlin & Co., engineers, Pittsburgh. An addition is being made to the steel building with a view to going into the manufacture of steel castings. A continuous furnace is being installed in the steel mill building, and the rolling facilities increased. At the blast furnace itself another blowing engine is being added to the pair at present in use.

Of the Collingwood works of the Cramp Steel Company, now in operation, the report has the following to say in part:

Contrary to the usual practice, the company have proceeded by erecting their open hearth steel plant and steel finishing mills before putting up a blast furnace. In this way, by procuring pig iron elsewhere, the company will be able to supply their customers with steel while their own furnace is being built, and meantime will not be accumulating large stocks of pig iron.

The open hearth plant consists of two 20-ton basic furnaces of the most modern design. The furnaces are of the straight line tapping type. The regenerators are by an ingenious method of construction placed under the charging platform, by which the checker work of the regenerators is expected to be four or five times that in the old style. The charging platform is in the rear of the furnace and further to the rear are the gas producers which furnish producer gas for reducing the steel. The product will be high carbon nickel steel, high carbon spring and tool steel and mild steel of various grades down to soft rivet steel.

Bounties Paid by Province.

Under the Ontario Mines act the Provincial Government has authority to pay a bounty not exceeding $1 per ton on all the pig iron produced from Ontario, the sum so expended in any year not to aggregate more than $25,000. In 1902 there were 53,868 tons of pig iron made from Ontario ore. On this quantity the full amount of $1 per ton could not be paid from a $25,000 fund. The total amount was distributed according to product as follows:

Hamilton Steel & Iron Company	$20,280.20
Canada Iron Furnace Company	4,569.50
H. C. Farnum	140.75
A. W. Hawley	9.55
Total	$25,000.00

Hutton Iron Range.

The report contains a paper by Dr. C. K. Leith of the United States Geological Survey and the University of Wisconsin on the Hutton iron ore deposits. It is based on a detailed examination of the area made by Dr. Leith in the fall of 1902. Depending upon the amount of siliceous or amphibolitic material which they contain, the ores vary from lean to high grade. Ordinarily, he says, the lean and high grade are in separate exposures. The siliceous impurities tend to lower the grade very rapidly, while amphibolitic and epidotic inclusions may be present in considerable abundance and the ore still be of good grade, although such impurities may slightly increase the difficulty of working in the furnace. "The ore has a strong effect on the magnetic needle, and magnetic readings enable one to connect up the isolated exposures into several belts." He compares the Hutton or Moose Mountain range with the Vermillion iron district of Minnesota. In the Hutton range the steeply inclined altitudes, the relations to surrounding green stones and green schists, the sharp and irregular contacts with these rocks, the intrusion by solid igneous rocks are similar to the features of the Vermillion range. But the Hutton ores are magnetite, while the Vermillion ores are hematite. The Vermillion ores have associated slate, but apparently with no coarsely elastic material. They are free from amphibole and epidote. Brilliantly colored jaspers are a characteristic of the ores of the Vermillion. These and other points of difference between the two deposits are referred to by Dr. Leith. He considers them "such that in the absence of any structural connection with the Vermillion district any correlation of the Moose Mountain and Vermillion iron bearing series would be a mere guess." He concludes as follows:

While much of the ore in the Hutton district is too lean for present use, there is also present a considerable amount of ore running above 58 to 60 per cent. in metallic iron. Sulphur, an element to be feared in magnetite ores, is in very small quantity; the considerable number of analyses which have been made of the ore show sulphur varying from 0.01 to 0.08 per cent. Titanium is altogether lacking. The ore is hard and crystalline. The rail haul to Georgian Bay is something like 60 miles, about the average for the Lake Superior ores. C. A. C. J.

According to the latest account the great Simplon tunnel of the Alps, which will be the world's longest tunnel, is about three-quarters completed, and when finished will be 14 miles long, or twice the size of the Mont Cenis bore. It is expected that the Simplon tunnel will be ready for use in about two years. Power for compressing air for the drills and refrigerating the tunnel is furnished by a flow of water from the south end of the bore at the rate of 15,000 gallons per minute. It is estimated that the cost of the tunnel alone will be about $1,000,000 per mile, or nearly the same as the contract for the subway under New York City.

In view of the general belief that railroad companies are retrenching, it is interesting to note that a press dispatch from Austin, Texas, credits the St. Louis & San Francisco Railroad Company with making an equipment contract for 100 locomotives, 27 passenger coaches, 6 postal cars and one dining car, the consideration named being $2,104,000. New York companies underwrite the contract.

Massachusetts Corporation Laws.

The State of Massachusetts has let down the bars on corporations, and the old stringent regulations governing the granting of new charters, the increase of capital stock of old corporations and the general supervision of all corporations are now of the past. A commission appointed by the Legislature went into the subject very thoroughly and decided that on the whole it would be better for the Commonwealth if fewer obstacles were placed in the way of business enterprises seeking charters, with a view to making Massachusetts charters more attractive, and thus rendering the growing custom of going out of the State for a charter less general. The Legislature passed a law along the lines of the recommendations made, and the result is that the number of new Massachusetts charters is increasing at a much more rapid rate than at any time for years past.

Under the old laws the amount of capital stock was limited and had be paid in in cash or its equivalent; the value of property against which stock was issued was determined by the Commissioners of Corporations, who had sweeping discretion; and a certificate could not be filed and business commenced until the capital was all paid in. Good will was not recognized as an asset; neither were services nor expenses, nor patents, excepting at the discretion of the commissioners. The list of stockholders was always open to public inspection. Directors and stockholders were liable for the debts of a corporation under certain conditions, as, for instance, where the debts exceeded the amount of capital stock. A Massachusetts corporation could not hold the stock of other corporations. It is easily understood from these facts that many concerns preferred to go to another State to obtain their charters.

All these rigid conditions are changed in the new law. The amount of authorized capital is not limited. Capital may be paid in in cash, property tangible or intangible, as good will or patents, services or expenses. The directors are the sole judges of the value of property or other rights. The list of stockholders is not open to public inspection. The cost of incorporation is decreased from one-twentieth to one-fortieth of 1 per cent. of the total capital stock. A tax of one-hundredth of 1 per cent. is imposed on foreign corporations doing business in Massachusetts, where formerly there was no tax on foreign corporations. There is no liability on the part of stockholders or directors excepting for wages of operatives within six months and in case of illegal acts.

This is only the general scope of the new corporation laws, but it gives some idea of the great change. Formerly Massachusetts had the most rigid corporation laws of all the States comprising the Union. Now the laws are as easy on corporations as most States; perhaps, on the whole, easy as any. But the general opinion in Massachusetts is that the new law is, everything considered, better than the old, in that it attracts new corporations which will be more easily looked after by the Commissioners of Corporations, and which are more readily taxed than in the case of a foreign corporation whose stock is held in the State. Regret is expressed, however, by some concerns who would prefer to have the world know that their capital stock figures represent dollar for dollar assets, and not a cent of water. But the commission which went deep into the corporation laws believe that the good points of the new law far exceed the weaknesses.

The New England Foundrymen.—The New England Foundrymen's Association will have a series of attractive meetings during the season, following their usual custom of gathering monthly for a dinner and to hear addresses by men prominent in lines of interest in the foundry business. This season's meetings will be at the Exchange Club, Boston, instead of at the Hotel Essex, as formerly. The speakers at the first meeting, Wednesday, September 9, were William E. Viall of the Brown & Sharpe Mfg. Company, and George N. Kingsbury, commissioner from Rhole Island to the St. Louis Exposition. At the October meeting Wm. H. Pfhaler, one of the prime movers in the Stove Founders' Defense Association and the National Founders' Association, will be a speaker. Other speakers expected to address the association during the winter are Thomas D. West, Edgar S. Cook of the Warick Iron & Steel Company, O. P. Briggs of the Minneapolis Steel & Machine Company and Dr. Richard Moldenke.

The Ft. Wayne Iron & Steel Company's Works.

The Ft. Wayne Iron & Steel Company of Ft. Wayne, Ind., recently incorporated with a capital stock of $175,000, have been organized by the election of the following officers: President, Edward F. Yarnelle, Ft. Wayne; vice-president, Walter I. Moody, Chicago; treasurer, John W. Sale, Ft. Wayne; secretary, Howell C. Rockhill, Ft. Wayne; general manager, Chas. H. Rawlins, Ft. Wayne. Half of the capital stock of this company is owned by the American Rolling Mill Corporation. The Ft. Wayne Iron & Steel Company recently purchased the Muskegon mill and have been removing much of the structural material and equipment to Ft. Wayne. The work of constructing the mill is progressing rapidly and is under the immediate supervision of Chas. H. Rawlins, general manager, and George H. Lowe, superintendent. It is expected that the mill will be in full operation by November 1. The main offices of the company will be at Ft. Wayne and the Western sales office at 727 The Rookery, Chicago.

The plant is located on a tract of 10 acres of level ground lying between the Pennsylvania and the Lake Erie & Western railroads, and on the Ft. Wayne Belt Railway, immediately west of the city. Five acres are covered with buildings. The finishing mill will be entirely of steel construction, and the muck mill building of wood and sheet iron. The following is a list of the various buildings under construction: Finishing mill, 142 x 308 feet; muck mill, 160 x 160 feet; machine and blacksmith shop, 40 x 50 feet; auxiliary boiler buildings, 30 x 40 feet; storeroom, 30 x 50 feet; gas producer building and coal bins, 40 x 68 feet. The plant will further comprise a modern office building, warehouse, shipping platforms and large raw material yard, and all requisite unloading, shipping, storage and switching tracks.

The muck mill will be equipped with one three-high 20-inch train, having two stands of rolls driven by a 28 x 60 inch Corliss engine, and gas fired puddling, scrap and busheling furnaces. Two 250 horse-power and one 125 horse-power Hyde waste heat boilers will be used. This mill is to be used for rolling puddle bar, faggot bar, billets and slabs, to be worked over on finishing mills.

The 18-inch bar mill will have two three-door gas furnaces and three stands of rolls driven by a 24 x 48 inch Corliss engine. This mill is to be used for rolling heavy bars, rounds and squares.

The 9-inch guide mill will have two four-door gas furnaces and a Belgian train, 12-inch roughing and 9-inch finishing of four stands of rolls driven by a 22 x 30 inch Corliss piston valve engine.

The production of the different mills for every 24 hours operated will be as follows: Muck mill, 100 tons; bar and guide mill, 150 tons. All of these mills are provided with cooling beds of ample capacity for the product, with all necessary shears, hot saws, &c., for cutting to lengths.

The manufactured product will consist of all kinds of merchant bar iron, rounds and squares, wagon tire, bands, ovals, half ovals, bridge and rivet rods, chain, shafting, screw and sucker rod iron. Sizes made are as follows: Rounds, 5-16 to 4 inches; squares, 5-16 to 4 inches; flats, ⅝ to 12 inches wide, and from No. 14 gauge to 2 inches thick.

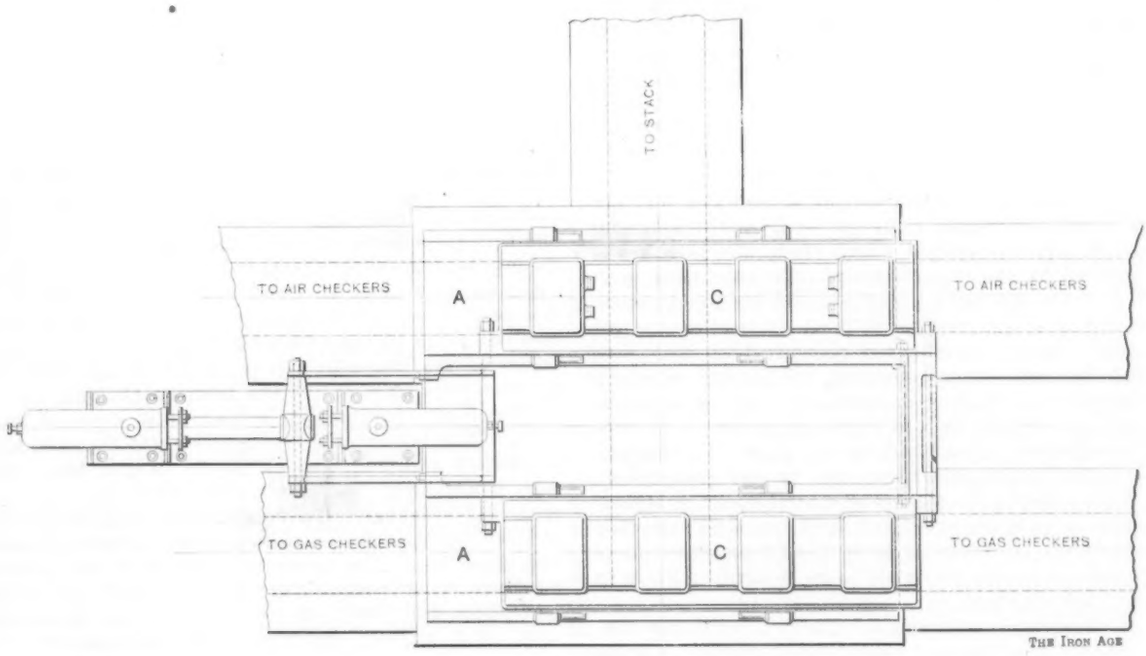
It is also the purpose of the company to add a modern plant for the manufacture of railroad track bolts, spikes, nuts, rivets and washers and similar specialties.

For certain kinds of work continuous mills are taking the place of the old style mills, but for jobbing work, such as this plant will handle, the type of mill installed, it is thought, more than holds its own, because of the fact that a complete change of rolls and guides, such as is required in changing from rounds to flats or squares, or *vice versa*, can be made in a comparatively few minutes whereas the new type of continuous mills must work for long runs on one size in order to show heavy output.

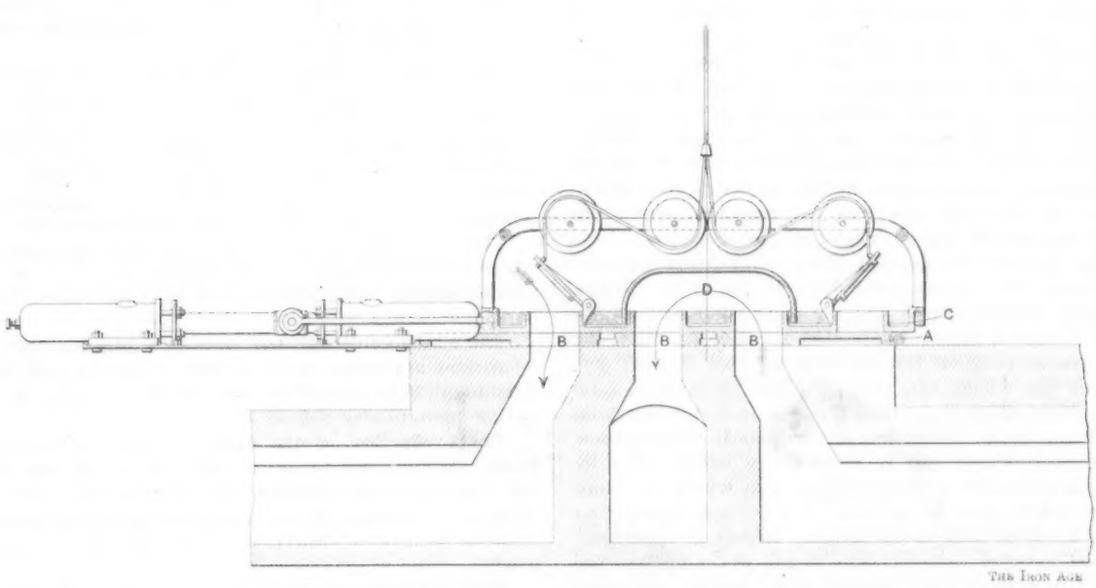
A New Furnace Gas Reversing Valve.

A new reversing valve has for some time been in use at the steel plant of the Cia. Fundidora de Fierro y Acero de Monterey, and has given such satisfaction that it has been adopted all through the works. Herman Schild designed the valve, and it was put into use by Wm. White, Jr., of Pittsburgh.

As the construction of this valve involves some new features, we present the following description: As will be seen from the drawings, a heavy cast iron plate, A, with three square or oblong holes, B B B, for the openings of the gas and chimney flues, covers the brick work around these flues. On this plate slides a pan, C, which has four openings corresponding to the openings in the bottom plate. The two middle ones of these openings are covered by a hood, D, forming a passage for the waste gases, and the two outer openings are connected by a U-shaped pipe, E, of corresponding section. On top of this pipe and forming part of it is another pan with a hole in it through which the live gases pass from the gas box F into the pipe E. Both pans are filled with water, the lower one to keep the bottom plate cool, the upper one to form a seal between the gas box and pipe. By simply sliding the lower pan with the hood and pipe across the openings of the bottom plate, live gas and waste gas are reversed. The reversing is done by a hydraulic cylinder, and both the air and gas valves are operated at the same time. The air valve is constructed in a similar way, but is simpler, as no stationary box is required. The regulating of the air is effected by a wire rope, which is connected to the covers of the air inlet. No gas escapes into the stack, and the moving parts being constantly cooled do not give the least signs of wear.



Plan



Section through Air Valve.

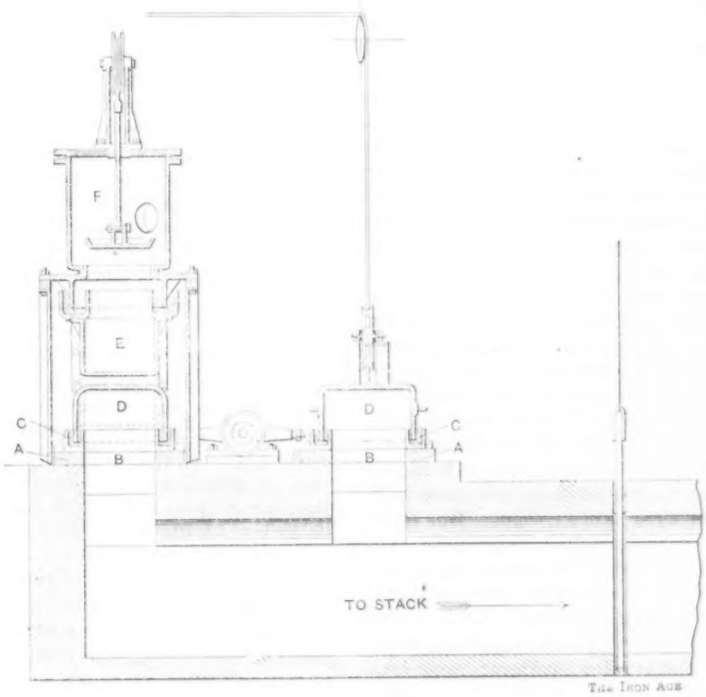
A NEW FURNACE GAS REVERSING VALVE.

The four corporations which lead all others in America in the number of stockholders are the following: United States Steel Corporation, 63,000; Pennsylvania Railroad Company, 35,000; Atchison, Topeka & Santa Fe Railroad Company, 18,000; and American Sugar Refining Company, 15,000. The United States Steel Corporation has led the list since the payment of its second quarterly dividend, and has now more shareholders than Pennsy-

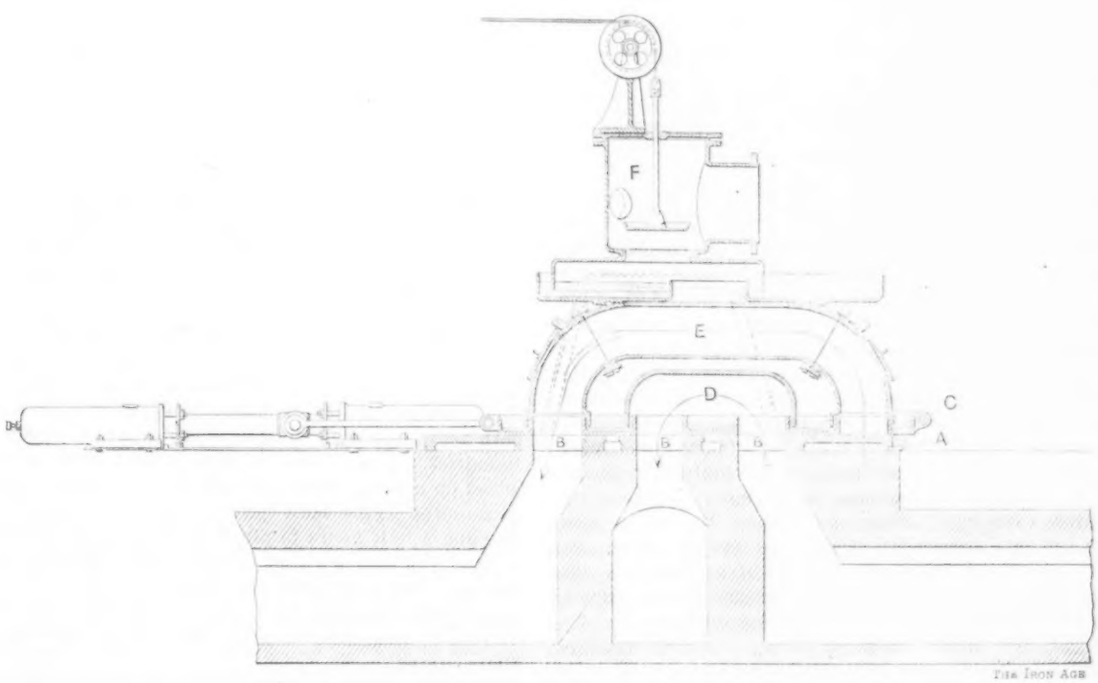
vania and Atchison combined, or, if the profit sharing plan is taken into consideration, more than its three nearest competitors combined.

The coal handling machinery installed by the C. W. Hunt Company, West New Brighton, N. Y., at the Lincoln Wharf Power station of the Boston Elevated Railroad Company recently lowered the world's record for rapid unloading. The coal was raised 90 feet above tide water and delivered to the storage pockets at the rate of 320 tons per hour. The installation follows in general design the standard Hunt steeple tower rig, the moving gear and coal cracker being electrically driven and the hoisting engine direct connected. The overhang of the folding boom is 40 feet, and the capacity of shovel 2 tons.

The members of the American Street Railway Association, the Street Railway Accountants' Association of America, and the Railway Mechanical and Electrical Association, who have been holding their convention at Saratoga, N. Y., went to Schenectady Thursday and devoted the afternoon to inspecting the extensive plant of the General Electric Company. The Railway Mechanical and Electrical Association elected the following officers: President, E. W. Olds of Milwaukee; vice-presidents, Alfred Green of Rochester, C. F. Baker of Boston, and



Vertical Section.



Section through Gas Valve.

A NEW FURNACE GAS REVERSING VALVE.

W. O. Mundy of St. Louis; secretary and treasurer, Walter Mower of Detroit; Executive Committee, T. J. Mullen of Scranton, H. H. Adams of Baltimore, and H. J. Lake of Indianapolis.

Emery Wheel Practice in Foundries.*

BY CHARLES G. SMITH.

An attempt to discuss in an exhaustive manner the possibilities of emery wheel practice plunges us into a subject of enormous depth and of far reaching effect. As this practice in our industrial institution is but in its infancy, the last few years have tended to elevate its dignity, from that of a necessary evil and one to be ignored, to the eminent position of one of the most modern and economical practices of the present day; its field broadening daily as our mechanics recognize its importance; it limitations not being confined to any one department, but its practical uses universal in its adaptability to all branches of manufacture.

This condition has been brought about mainly by the persistence of the few who have had faith enough in its success in ascertaining, at an enormous expense to themselves, the facts in the case, and forcing it into practice against much prejudice and opposition, until now it is becoming common practice. Like all other new methods in shops, there is invariably considerable opposition, and many impediments are placed in the way of bringing about the success of anything that is at variance with the common customs that have been in vogue. But those who have championed emery grinding have, with considerable effort, finally succeeded in having it placed among those important places alongside the other machine tools in the shop and in factories. Until recent years there has been but very little accomplished along these lines, and I shall this evening endeavor to present to you only some of such matters as have come under my own personal observation, and set forth only such matters as have come into my own personal experience.

Conditions Necessary to Secure Good Results.

A few years ago in nearly every shop, and at present in a great many shops, when one is about to buy an emery grinding machine, it is his opinion that almost any style or kind of machine will answer the purpose, and when this machine is received it is set any place in the shop without regard to stability. Any pulley that may be lying around the shop will be put on the line shaft, and any emery wheels had from stock in some supply house will be put on the machine, and because they look to be running fast, the speed is correct. No consideration is given to the diameter of the spindle in selecting the size of the wheels that are to be used on the machine, and, after such careless consideration, good results are expected, and if the desired results are not obtained then a conclusion is reached in very many cases that satisfaction cannot be had by the use of emery wheels. But, to the contrary, if the proper care is taken in the selection of the machine, and as much care taken in setting it up, and the proper speeds and grades obtained, it is surprising to know the increase of efficiency. And, as the conditions vary in almost every shop, the above mentioned points should be ascertained by the party proposing to furnish the machine or wheel, as there are very many things to be considered in obtaining the satisfactory results, some of which I will bring out later.

There are many kinds of emery grinding, foundry grinding and machine shop grinding, and each of these can be subdivided into a number of different classes of work. In iron foundry work there can be very little grinding done with economy on heavy castings, unless the iron is hard, in which case the swing frame machine with about 20 x 2½ inch wheel, running at 1200 revolutions per minute, will grind considerably faster than it could be chipped. The amount of gain in grinding will, of course, depend on the hardness and ductibility of the iron. I have seen iron castings so hard that it took two men one and three-quarter hours to chip the gate and fin from one side. In such cases as this two men could have ground this gate and fin with a swing frame machine in a very little over 15 minutes. But on soft iron the advantage is in favor of the chipping, as in this case the iron spawls before the chisel, and the man with one blow of the hammer can remove considerable of the gate and fin, which gives a great advantage in favor of the chipping. In a great many foundries I have noticed that the grinding on light castings has been done on light machines, using small wheels, and in almost every case the machine has been set without any regard to its stability.

Stands Should Be Substantial.

Now you will invariably be reimbursed if, in buying an emery grinding machine, you purchase a heavy stand with long bearings and large diameter of spindle, and by placing it on a concrete foundation you will find that the machine will run a great deal smoother than if it was standing on the floor, which will enable the wheels to run smoothly and cause them to become out of true a great deal less than were they set so that there may be vibration in the spindle. This will cause considerably less dressing of the wheel, and as it is always necessary to dress the wheel to the lower point when it has become out of true, you will receive more than reasonable interest on your investment in the foundation in the amount of emery that you save in truing your wheel. Then it is often the case that wheels too small have been used to accomplish satisfactory results. The largest diameter wheel practicable should always be used for doing any kind of grinding. For instance, a wheel 24 inches in diameter will do more work per dollar invested down to 18 inches in diameter than an 18-inch wheel will do. Another point to be regarded is the belt power furnished to drive the wheel. It is very necessary that there be belt capacity enough on the machine to keep the wheels up to speed while they are under duty, as the speed of a wheel when running idle will have no effect on the work if it is not kept up to this speed when it is doing the work. Neglect in the above mentioned points has caused many to abandon the practice of grinding their castings with emery wheels.

For grinding any castings in a foundry where the man can lift the casting up to the machine it will be found that the most economical and satisfactory results can be obtained by having a heavy machine with a 24 x 3 inch wheel driven with a 5-inch belt, the wheel speeded at 1000 revolutions per minute. This will give you wheels heavy enough to resist pressure of the work that will be forced to the wheel, and the power that is in the belt will force the wheels to cut instead of shrinking from duty and becoming out of true, which invariably happens where the belt power is insufficient, and the man pressing at uneven pressures will bring the wheel to slacken its speed at intervals.

In Steel Foundries and Plow Factories.

In steel foundry practice the emery wheel has been found to be quite a success, and is as far ahead of any other method that is commonly in use to a large scale on both heavy and light work as is the case in malleable iron foundries. I have seen a gate ground with an emery wheel on a swing frame grinder by two men in less than 15 minutes. This same gate would have required about two and a half hours to plane or shape from the casting, so that you will see that the saving is enormous in this instance over and above the machine work, and as compared with chipping by hand, where two men are required, it will make a great deal better showing than above stated.

Within the last few years large grindstones have been and are being displaced by the emery wheel to a very great extent, and I believe that within a reasonable time the grindstone will be a matter of historic relic. This has been attended with many difficulties, as prejudice on the part of the consumer has placed many an unnecessary obstacle in the path of success, but the advantage was so flagrantly in favor of the emery wheel that every obstacle is being surmounted, and for many purposes many firms have discarded their grindstones and found it justifiable in equipping with new emery wheel machinery entire.

For instance, grinding plows, which has always been

* Paper read before the Pittsburgh Foundrymen's Association, September 7, 1903.

done on grindstones, has undergone an entire reformation of practice, and nearly all plows, no matter how they are made, whether tempered or chilled, are now ground on emery wheels. When this matter was undertaken the manufacturers of the plows claimed that this could never be accomplished, and raised one objection after another, first stating that the temper would be drawn, next stating that the man could not earn a day's wages; next they would state that the emery wheel would not last long enough to overcome the difference in cost between the grindstone and the emery wheel. One by one all these were overcome, until at present the men are making more money per day than they were on the grindstone. The practice is a whole lot cleaner, as they do not have to work in the sloppy shop that they were compelled to with the grindstone, and the cost of the emery wheels as compared with that of the grindstone has given considerable of a saving to the manufacturers. In some instances they are saving enough to justify their throwing out the old equipment and installing an entire new plant, and, in some cases, building new buildings for doing this kind of work.

Machine Shop Grinding.

In machine shops the development of uses for emery wheels has been remarkable, and there is to-day an immense amount of work done with the emery wheel in the machine shop that a few years ago was not considered practicable. In a shop in Western Pennsylvania a recent test was made in which a shaft which had 1-64 inch all around to be removed was placed in an emery grinding machine, at the same time a duplicate of this shaft being placed in a lathe. The grinding machine finished the shaft in a little over 37 minutes, leaving it in better condition than the lathe on which it took two hours and eight minutes to finish. Another test on an emery surface grinder with a wheel 12 x 2 inches, medium hard and very coarse on cast iron, showed most excellent results with a cut ¼ inch deep, ⅛ inch cross feed and 35 feet table feed per minute. This seems almost incredible.

The most recent development in design of emery grinding machines is a surface grinder with a circular table, similar to a boring mill, the wheel about 16 x 2 inches, and to be automatically fed in to the center aud out to the edge, and the machine so substantially built that for heavy cuts and accurate work it is well adapted to grind valves of steam pumps, air compressors, &c., to leave them perfectly tight. This will tend to show that the emery grinding manufacturers are determined to eventually invade all branches of machine shop practice. There is also another machine being designed for grinding very heavy shafts, that is intended not only to finish the work, but where shafts can be cast, or forged reasonably close to size, the emery grinder will remove the stock and also finish the work without having to put it on a lathe for the roughing cut.

Points to Be Considered.

In obtaining results in emery grinding there are several things that must be considered: 1. The required condition of the work when finished. If it is to be polished when taken from the machine, or polished by buffing afterward. In the latter case the number of emery that is used in the buffing must be considered. Then also, if the material to be ground is tempered or not before or after grinding. 2. How much stock is to be removed. 3. What is the nature of the material to be ground, cast steel, machinery steel, chilled iron, cast iron, brass, malleable, and is it hard or soft? 4. Are the pieces light or heavy in weight? How much metal is there in the part to be ground to absorb the heat? All these must be considered to ascertain the proper method of performing the work and the grain and grade of wheel to do it correctly.

In regard to grain and grade of wheels I would say the best results are always obtained by using as coarse a wheel as possible and hard as possible, as a coarse, hard wheel will not fill with metal so easily, and being hard will not scratch so deeply. In a recent test that I made where the steel was hard and to be tempered and very highly polished, we produced much finer work on a wheel 36 x 8 inches, made of No. 16 emery and hard, than one of No. 46 and softer. The latter made deeper scratches that could not be polished out, and the former left the work in excellent condition, and when polished the work was in as perfect condition as after having been ground on a grindstone.

Better results will also be obtained by using wheels of large diameter; the larger the diameter of the wheel the better the results. I have had parties complain to me in shops and foundries that they were not able to get any results from grinding their work, and, upon examining the conditions, found that they had a small machine, carrying a 14 or 16 inch wheel about 2-inch face, the machine merely bolted to the floor, with considerable vibration in it. Inducing these same parties to install a substantial machine and use a 24 x 3 inch or 4 inch wheel, running at 1000 revolutions per minute, and having the machine on a concrete foundation, they were astonished at the difference in the results. For heavy steel castings, chilled iron or hard iron castings excellent results may be obtained by the use of a swing frame grinding machine with an elbow joint, operating with a man on each side of the wheel. I have seen a steel gate on a heavy steel casting 5½ inches in diameter, ⅝ inches high, ground entirely away in 13½ minutes with one of these swing grinding machines, with two men operating the machine.

Another point of considerable importance is the speed at which the emery wheel runs. You should be just as particular in getting the proper speed at which to run an emery wheel for producing the best results as you are in procuring this information to start a planer or a lathe or any other machine that you are setting in your shop. Were you to buy a planing machine and ask the manufacturer for the speed, which he would advise you to be 375 revolutions per minute, you would not run it at 250 or 500 revolutions per minute. Now, on an emery wheel a few revolutions per minute may mean a lot in result.

In a test to ascertain some facts in regard to this point a machine was rigged so as to give a uniform pressure against the wheel. A piece of steel was cut exactly in half and the wheel speeded at 5000 feet peripheral speed per minute, and one of these pieces of steel was ground on the wheel under those conditions. Then the wheel was speeded to 6500 feet peripheral speed per minute, and under the same pressure the other piece of this steel was ground, and it was learned that about two and three-quarter times the metal per cubic inch of emery was ground at 6500 feet per minute as was ground at 5000 feet per minute, and this same amount of grinding was performed in three-quarters of the time.

Now I shall conclude by asking you to give this subject more serious consideration, and also ask you to be careful and have substantial foundations and long bearings, strong spindles, the proper speed, and the proper grade of wheels, and you will obtain excellent results.

The Schoen Car Wheel Company.

The new car wheel plant of the Schoen Car Wheel Company, at McKees Rocks, Pittsburgh, Pa., has been put in operation. The new plant has been built under the personal direction of Charles T. Schoen, the inventor of the process, under which steel wheels will be made. The original plans of Mr. Schoen were to have a portion of the works devoted to the steel casting shop necessary to turn out the steel blanks from which the steel wheels will be made, but for the present this has been abandoned, and the Pennsylvania Malleable Company are changing one of their iron furnaces so that they can handle steel instead of iron. Regarding the process of making steel wheels under the Schoen patents, it is claimed that the solid steel wheels can be made at a cost of about $26. This is about half the price of the present steel tired wheel, now used on the standard passenger cars. The casting of the blanks from a steel melting furnace at the Pennsylvania Malleable Company will necessitate the use of soaking pits in the wheel works for the reheating of the blanks before they are finished in the milling department, and this will add slightly to the cost until the entire plant is completed.

E. A. Pflueger has been appointed trustee for the Ohio Iron & Steel Specialty Company of Cuyahoga Falls, Ohio. A second meeting of the creditors is to be held on September 10.

The Iron Age

New York, Thursday, September 10, 1903.

DAVID WILLIAMS COMPANY, - - - - - - - - PUBLISHERS.
CHARLES KIRCHHOFF, - - - - - - - - - EDITOR.
GEO. W. COPE, - - - - - - - - - - ASSOCIATE EDITOR.
RICHARD R. WILLIAMS, - - - - - - - - - HARDWARE EDITOR.
JOHN S. KING, - - - - - - - - - - BUSINESS MANAGER.

Disproportion of Gross and Net Railroad Earnings.

Some important deductions may be drawn from the exhibition of railroad earnings recently compiled by the *Financial Chronicle*, which are of special interest and importance at the moment. The most significant feature of the exhibit is the relatively small increase in net earnings as compared with the large gain in gross receipts. The *Chronicle's* returns for the first six months of 1903 cover 159 different railroads, with an aggregate mileage of 145,418 miles, which is slightly less than three-fourths of the aggregate mileage for the entire United States, but the roads making returns carry a larger proportion of the total tonnage.

In round numbers, the gross earnings during the first six months of this year were about $727,900,000, against $637,700,000 during the corresponding period in 1902, or a gain of over $90,000,000, about 14.15 per cent. The net earnings, however, showed a very moderate increase, being for the first six months of 1903 somewhat over $218,000,000, as against about $198,000,000 during 1902, or a gain of over $19,500,000, about 9.97 per cent.

The reason for the relatively poor showing of net returns was, of course, due to the large increase in operating expenses, which for 1903 were nearly $510,000,000, as compared with about $439,500,000 for 1902, or an increase of nearly $70,500,000, or 16.04 per cent. The striking disproportion between the net and gross earnings is intensified when the returns are looked at in detail.

The cause of the gain in gross earnings is sufficiently obvious. Not only has there been a large increase in the volume of miscellaneous freight moved, but some equalizing rates have been put in force which have caused an average advance, although it is impossible to determine precisely what share the higher freight rates have had in producing the larger earnings. Then, too, as compared with the previous year, general conditions during 1903 were more favorable, as during 1902 the deficiency of the corn crop of 1901 and the early effect of the coal strike, which began about the middle of May, caused a shrinkage in earnings.

Probably the most important factor in causing the proportionately larger increase in operating expenses was the higher wages paid to labor, but the higher cost of fuel and other material was also responsible to a great degree. The higher prices for supplies purchased by the railroads, too, were also due to increased wages.

The relatively small increase in net earnings, in proportion to the business transacted, finds a counterpart in the record of the preceding year. Then, with an increase of about $39,000,000 in gross earnings—notwithstanding the great falling off in agricultural tonnage—the gain in net returns was less than $7,750,000. Under normal conditions net earnings are much larger and the unfavorable proportion between net and gross returns for the last two half years is brought out by comparisons with the two preceding years. In 1901, with an increase a little less than $158,000,000 in gross, there was a gain of $26,750,000 in net earnings; and for the first six months of 1900 gross earnings showed an increase of $70,750,000, while the net returns increased $25,000,000.

Upon higher wages and cost of material, then, falls the responsibility for the present unsatisfactory conditions, and we naturally look to a lowering of these costs to bring about a better relation between gross and net earnings.

It is a significant fact that nearly one-half the gain in net earnings falls to the anthracite roads, which makes the situation relatively worse for the remaining companies. Last year, because of the disastrous strike, the anthracite roads showed a decrease of over $3,000,000 in gross and over $2,000,000 in net earnings for the first six months. This year, however, roughly there was a gain of over $12,500,000 in gross and nearly $9,000,000, or 76 per cent., in net returns. This showing of the coal roads is due not only to the increased output but to higher prices prevailing for coal, as transportation charges are based upon the market price of this commodity. By this it is notable that these railroads have been able to recover some of the loss of the preceding year, but consumers and industries which suffered incidentally have had little opportunity to make good the losses which they sustained resulting from the strike.

While the coal roads seem to have gathered more than their share of the net revenue, other important systems have sustained a greater proportion of operating expenses. This is peculiarly notable in the case of the Pennsylvania Railroad—always regarded as a typically well managed road—on the lines of which, both East and West of Pittsburgh, there was a gain of upward of $10,000,000 in gross earnings as compared with the preceding year. The higher operating expenses, however, not only eliminated this gain but left a net loss of over half a million dollars. There can be little doubt that the Pennsylvania will later reap a rich harvest from its great improvements. The Lake Shore & Michigan Southern is a similar example, that road reporting a loss of nearly half a million dollars coincident with a gain of over $2,700,000 in gross receipts. The New York Central makes a much better showing, but even this road, with a gain of nearly $5,600,000 in gross receipts, shows a net gain of only $834,000. Southwestern and South Pacific roads seem to have been particularly unfortunate in gathering net revenue, which is accounted for, in part at least, because of the relatively small increase in transportation charges in those sections.

In the foregoing we doubtless have the secret of the attitude which the financial departments of various roads throughout the country have taken recently in regard to assuming further liabilities resulting from pressing needs of the operating departments. While there is much activity in railroad construction at present—and probably will be up to the time when snow and ice prevent a continuance of work—it is known that the financial managements have given cold reception to requisitions for increased equipment and other betterments on various systems. Important roads like the Pennsylvania and the Big Four are known to have canceled important contracts for betterments, and in some instances other roads have canceled contracts which were to have run for several years, and contractors who only recently purchased equipment to carry on such work announce that their outfits will be for sale after 60 to 90 days. There has already been a reduction in prices of some fuel and raw material, and it would seem that wages would be the next to bear their proportion of the decrease. At any rate the financial managements of transportation lines seem determined to bring about a more normal relation between gross earnings and operating expenses, which, of course,

would be reflected in net revenue. It may be that this attitude has been forced by the inability to market securities advantageously. But whatever the cause the result will doubtless be a better proportion between gross and net earnings during the next six months. In the meantime we are apt to have a repetition of freight congestion on the railroads without a prospect of relief, as scarcely a line is provided with equipment adequate to its maximum needs.

British Views of the Cunard Subsidy.

The Parliamentary discussion over the plan of the British Government to subsidize the Cunard Steamship Company on a scale of unprecedented liberality has unusual interest for those concerned in the development of an American merchant marine. The telegraphic accounts were too meager to be instructive beyond the mere recitation of facts. The full report of the Parliamentary debate makes clear a great many things which were previously unintelligible. While the motion to approve and ratify the agreements was carried, it was not until there had been a division aimed at the Government, which, if sustained, would have been an embarrassing defeat for the Ministry.

Mr. Robertson appears to have been selected to voice the views of the opposition, and he discharged this duty with great force and vigor. He called attention to recent declarations on behalf of the Cabinet warranting the popular impression that Admiralty subsidies had been abandoned and pressed an inquiry as to the special conditions which warranted so emphatic a departure from this rule as was involved in the proposition to hand over to a company whose capital stock was only £1,200,000 the considerable sum of £2,600,000 at 2¾ per cent. per annum interest, which was 2¼ per cent. less than it could have obtained this money for from any other source. The bonus concealed in this low rate of interest amounted to 4 per cent. per annum during the period of Government co-operation on the entire subscribed capital of the company.

He felt a natural and warranted curiosity to know whether the British mercantile marine could not be trusted to hold its place in the ocean carrying trade of the world without the inducements supplied by this remarkable agreement, and intimated that a different view of the case was "a confession of failure, not only on the part of the Admiralty, but on the part of the mercantile marine as well." He ventured the opinion that the Cunard agreement had grown out of the popular panic created last year by the Morganeering of several lines of steamers in the North Atlantic trade, and since it had been shown by the outcome of that movement that the International Mercantile Marine was by no means as formidable a menace to British interests as had been assumed, it was difficult to see why the Government felt under the necessity of carrying out a plan devised at a time of groundless and unreasonable panic which had completely subsided.

Mr. Lough followed in much the same vein. He moved an amendment to the motion before the House, expressing regret that "an arrangement was made with the Cunard Company without first ascertaining by public competition the terms upon which the Government's requirements might have been met by other companies." He stated that the only object of the loan of £2,600,000 at 2¾ per cent. was "to place a trading company in capital," and called attention to the fact that in the terms of the agreement there was no restriction upon the manner in which the money should be spent except that it be to the advantage of the company. He was curious to know why the Cunard Company had been singled out for this unique advantage, without an effort to find out whether any other company of equal standing might not have been willing to accept this money on the same or even more advantageous terms. He considered the terms upon which the Government was authorized to take the ships of the company "extremely high." Under the arrangement in 12 months it would pay the full price of the smaller ships, and in 15 or 16 months of the larger vessels. He was sure the Government had rushed into this arrangement in a moment of panic, "when it was thought the Americans were going to buy up the whole country."

This put the apologists for the Government on their mettle. Sir F. Flannery stated that the Government had practically no choice in the matter, having been forced into the agreement by public opinion. If the panic of a year ago had been dispelled, as some of the speakers had stated, it was for the reason that this agreement had been entered into, thus giving the best assurance possible that the Government was neither ignorant of, nor indifferent to, the fact that if not checked the Americans would swallow up the Atlantic passenger trade. "If the American millionaires who controlled the American railways had been able to get hold of the Atlantic passenger trade they would have established a complete monopoly. As it was they absorbed half a dozen steamship companies. The Cunard Company alone held out, not from patriotic motives, but as a matter of business. They were like the last voter in the old corrupt days, who got the biggest price by keeping his vote until just before the closing of the poll." This would not seem to the average reader like a strong argument in support of the Government's position; however, it probably has the essential merit of truth to commend it. Sir F. Flannery was sure the effect of the new policy would be to restore the prestige of the British flag.

Sir W. Allen then went to the bat and tried his hand at spoiling the curves of the opposition. He was weak in his arithmetic. He said: "It might appear on the face of it that the Government were making a bad bargain in agreeing to find £2,600,000 for the Cunard Company, but what did they get in return? Seventeen old vessels which were not overvalued at £1,990,000, and were to have two new steamers representing a value of £2,600,000, or a total of about £4,500,000, as security for the money we are lending." This speaker seems to have overlooked the fact that at the market value of the Cunard Company's shares their total assets, including good will, are only £1,200,000, or £790,000 less than his estimate of the value of their old ships. As an advocate Sir. W. Allen would seem to be singularly unsuccessful, and from such advocacy of its plans the Government might well pray to be delivered. Concerning the new ships to be built, he said he did not want a mere spurt of 24½ knots. He wanted to see them crossing the Atlantic at that speed day in and day out. It was not a mere question of money; that was easily obtained; it was a question of design. If the speed was not got then the money was thrown away. In conclusion he felt called upon to congratulate the Government on its move in the matter of the Cunard Company, but gave notice that if the new ships did not attain the prescribed speed "the whole undertaking would be an unmitigated failure."

Mr. McArthur was scarcely more successful than his predecessors on the floor in making the plans of the Government appear reasonable and advantageous, but succeeded in contributing something to the gayety of nations. His argument was characterized by breadth of misconcep-

tion and comprehensiveness of misinformation, and concluded with the following showing of what the Cunard Company did in return for the liberal assistance of the Government:

> In the first place, they guaranteed the British character of these vessels. The shares were to be British, directors British, and the principal officers, the master engineers and three-fourths of the crew were to be British subjects, while half of the crew were to belong to the naval reserve. They placed the whole of their fleet at the disposal of the Government to buy or hire, and they agreed not to hire or sell any vessel of their fleet without the previous consent of the Government, and they gave the Government a controlling interest in all matters affecting this agreement. The company virtually surrendered their independence, and became virtually a state concern.

If this array of reasons is sufficient for putting the Cunard Company in a position of such conspicuous advantage, it would seem to constitute a just basis of demand for a liberal subvention of the International Mercantile Marine Company—at least as to so much of their fleet as has been accorded the privilege of continued British registry. All the ships of the fleet which were British before the merger are British still and will remain so. They are subject to requisition by the Admiralty if needed, even in the event of war with the United States. They must be officered and manned by British subjects. Of this great and alarming merger it may be said as truthfully as of the Cunard Company, it has "virtually surrendered its independence and become virtually a state concern." It has done nothing whatever to build up or encourage the shipping interests of the United States, and, so far as can be predicted, never will do so. Why it was formed is still a question which each one for whom it has interest may answer in his own way as satisfactorily as if he adopts the views of another. It has at least served to establish the fact that the British nation is prepared to do a great deal to checkmate any move originating on this side of the ocean to establish effective competition with its shipping interests; but that its position in this field of enterprise is not by any means invulnerable may be assumed from the magnitude of the panic caused by the comparatively unimportant negotiations of Mr. Morgan and the surprising price it has agreed to pay to keep the Cunard Line British. Whether the advocates of measures looking to the encouragement of our ocean fleets will find in these facts cause for satisfaction or apprehension we frankly do not know.

Restrictions on Foreign Corporations.

In almost all the States and Territories there have recently been enacted stringent statutes denying to foreign corporations the right to sell goods and transact business generally, except upon compliance with certain formalities and the payment of certain fees and license taxes. By the term "foreign corporations" is meant not only those organized under the laws of foreign countries, but also those created by the laws of other States. Thus a New York corporation is "foreign" in New Jersey, and a New Jersey corporation is "foreign" in New York. The statutes of the several States differ in details as to the form of procedure required in order to enable such a corporation to obtain the right to transact business. But, in substance, the regulations are the same. The foreign corporation must file with the Secretary of State a copy of its charter and a statement of the nature of the business proposed to be carried on in the State, the amount or proportion of its capital stock to be employed within the State, its office in the State, and the name of its agent in the State upon whom legal papers may be served. It must pay certain fees for the filing of the papers, a license fee varying with its capital employed in the State, of an equal amount required of domestic corporations, and it is in future subject to yearly taxation on that proportionate capital like domestic companies. It must, in addition, file certain annual reports. In many of the States a formal license or certificate is issued by the Secretary of State authorizing the foreign corporation to transact business. Severe penalties are provided for failure to comply with these requirements. In some States the company and its agents are subject to fine and the agents to imprisonment. In others the officers, directors, stockholders and agents become personally liable for the debts of the corporation. And in many no suit or action at law can be maintained by such a corporation to recover on its contract for goods sold in that State or on other contracts. Some statutes expressly declare that all such contracts shall be void as to the corporation. Some statutes are silent on this subject, as in Pennsylvania; but the courts have construed the law to imply that contracts will not be enforced, and no recovery at law on debts will be permitted. The legal argument is that if the corporation is doing an unlawful act by selling goods in the State without a proper license, the law itself will not enforce any rights under the unlawful contract. Otherwise the statute would be nugatory, and we think this would generally be held in other States as well as in Pennsylvania. One exception should be noted. Where the statute provides for a single specific penalty, such as a fine, it might be held that no further penalty is to be implied. This depends on the wording of the statute. If the law does not make the contract itself unlawful, then the punishment is limited to the precise penalty specified. Some States make the contracts void; others, like New York, do not, but impose as a penalty that the corporation shall have no remedy by suit at law. The courts, however, in the different States, have differed very much in their methods of construction of these statutes, some construing them strictly, like Pennsylvania, against the corporations, and others, like New York, regarding them as highly penal, and therefore to be construed, wherever possible, in favor of the corporations. Many exceptions to the application of the statute have been distinguished by the decisions in New York, which in other States have been held to be violations.

When these statutes were first enacted it was commonly supposed that they applied only to foreign corporations actually establishing a branch store or shop or office in the State. That view, erroneous as it is, is still prevalent. But it is now generally held by the courts that selling goods by traveling salesmen is "doing" or "transacting" business within the State. The test as to whether the foreign corporation is or is not violating the law seems to be the question: Was the contract of sale or other contract made in the State?

If a foreign corporation, acting through an officer, agent or salesman, comes to another State and actually there makes a sale or enters into a contract, it has transacted business contrary to law, and if it has not previously obtained the license, it is liable to the penalty. It is held in New York, however, that if the traveling salesman only takes the order in the State, subject to the approval and acceptance of the home office of the corporation outside the State, and if the acceptance is made there and the goods shipped from there, then the contract is not made in New York, but in the foreign State, and the law does not apply. But if the salesman makes a valid, final, enforceable contract in New York, it would apply. This rule, however, does not seem to be followed by the courts of Pennsylvania and some other States. In New York also a factor or selling agent of a mill selling in his own name under a commission agree-

ment with the foreign corporation does not violate the statute.

The object of this legislation, apparently, was to prevent a foreign corporation from doing any business in the State which would be contrary to the public policy of that State, and from exercising powers in the State which it might obtain under very liberal laws of its home State, but which would not be granted even to a domestic corporation in the State where it wished to do business. Of course, no State would permit a foreign corporation to compete with its own corporations with privileges forbidden by its own laws. A State therefore would have a right, in a proper case, to absolutely exclude a foreign corporation from its territory, and that right has sometimes been exercised.

A further object of the law is to compel the foreign corporation to appoint an agent resident in the State upon whom legal process can be served. In this way a domestic creditor can obtain jurisdiction and sue in his own State without being compelled, as he otherwise would, to bring action in a distant State. Another object is to subject the foreign corporation to the same taxation, as to its capital employed in the State, as falls upon the domestic corporation. Theoretically this is entirely fair and proper, but in practice it is doubtful whether much benefit is actually derived.

These are the reasons put forward in defense of these laws. Doubtless there is merit in some of them, but in view of the vexatious effect on interstate commerce, it is seriously to be questioned whether the severe penalties imposed, particularly the prohibition of the recovery of debts, are justified. The question has been raised as to whether such laws are not unconstitutional under the Federal Constitution, which provides that Congress alone has power to regulate commerce between the States. But the Supreme Court of the United States, in 1884, decided, in the case of Cooper against Ferguson, that "the right of the people of a State to prescribe generally by its laws the terms upon which a foreign corporation shall be allowed to carry on its business in the State" is unquestionable. The statute of Colorado on this subject was upheld as valid. Such regulations as to certain corporations, for instance insurance companies, are absolutely necessary. A corporation is a creature of the law endowed with certain privileges. It is not for the benefit of society that corporations should have all the rights of individuals, and the States which create them have the legal right to control not only their own, but those which come from other States into their jurisdiction. A State cannot discriminate against foreign corporations, however, and it will be noticed that the demands made upon foreign corporations are no more onerous than those upon its own domestic corporations. Such legislation, therefore, is constitutional, under the decisions, so long as it does not amount to a regulation of interstate commerce, and if the requirements are substantially uniform between foreign and domestic corporations they are valid in law. The question may very well be raised, however, as to whether these restrictions and penalties are justified by considerations of business interests and public policy, even if sanctioned by the law.

The States in which the penalty is provided that corporations failing to comply with the statute shall not have the right to maintain actions at law to recover debts are Arkansas, California, Colorado, Alaska, Arizona, Illinois, Indiana, Kansas, Maryland, Missouri, Montana, New Jersey, New York, North Dakota, Pennsylvania, Tennessee, Texas, Washington and West Virginia.

Florida, Georgia, Kentucky, Louisiana, Maine, Mississippi, Nebraska, Nevada, New Hampshire, North Carolina, Rhode Island, Vermont and Virginia have no statutes on the subject whatever.

The following States have enacted the statute, but prescribe no penalty: Alabama, Idaho, Massachusetts, Minnesota, Ohio, Oregon, South Dakota and Wisconsin.

California, Connecticut, Delaware, Illinois, Indiana, Iowa, Missouri, Pennsylvania, South Carolina, Tennessee, Utah, Washington and West Virginia provide for heavy fines both on the corporation and its agents, and for imprisonment for short terms for local agents attempting to do business in the State.

In Massachusetts the right to recover in actions at law is not affected by the law.

In Minnesota and Missouri the law does not prohibit sales made by traveling salesmen; in Pennsylvania the rule is otherwise.

In Ohio corporations complying with the law are exempt from attachment. No other penalty is provided for, and probably the law would not prevent recovery of debts.

CORRESPONDENCE.

"Build" or "Manufacture."

To the Editor: In your issue of August 13 we read the question asked by "New England," as to which is better usage—to "build" a machine tool or to "manufacture" it. From your note we understand that you are of opinion that the verb to build is used with reference to heavy machine tools, the verb to manufacture to lighter machines, which can be assembled by hand.

Although this may be customary, we beg to point out to you that our experience in collecting the matter for the "Technolexicon" (the tri-lingual technical dictionary to be published by the Society of German Engineers) shows us that the verb to build (a machine) is generally used in such instances where the respective machine is constructed singly, one at a time, whereas the verb to manufacture is applied when machines are constructed in larger quantities at a time. This more general definition of the two terms also includes the sense given by you, as heavy machine tools will only very exceptionally be constructed in large quantities, but generally only one at a time, and thus be built and not manufactured. Nevertheless, we shall be very interested to read what other people say on this point. DR. HUBERT JANSEN.

BERLIN, GERMANY, August 31, 1903.

The Pennsylvania Railroad Company's Great Coal Interests.

Contracts are stated to have been signed under the terms of which George I. Whitney of Whitney, Stephenson & Co. of Pittsburgh undertakes to deliver for cash a controlling interest in the Monongahela River Consolidated Coal & Coke Company to the Pittsburgh Coal Company. Henry W. Oliver represented the Pittsburgh Coal Company in the negotiations.

A story is current to the effect that the deal just announced is but the forerunner of one that is gigantic in comparison. It is said that the Pennsylvania Railroad Company have secured practical control in the Pittsburgh Coal Company, and this with the control of the river coal interests through the Pittsburgh Coal Company will give the Pennsylvania Railroad control of one-fourth of the total output of bituminous coal in the entire State of Pennsylvania. As a railroad by law is not allowed to operate any coal mines, the holdings will be transferred to the Pittsburgh Coal Company, who will operate the property.

The Monongahela River Company are capitalized at $40,000,000, and their output last year approximated 8,000,000 tons of coal. The combination of interests will represent a total of $132,000,000 and the tonnage close to 25,000,000 tons.

The Chicago Pneumatic Tool Company.

During the past few days a vast amount of gossip has been printed relative to the Chicago Pneumatic Tool Company, the majority of which was entirely without foundation and apparently malicious in nature. As it does a great injustice to the company and their officials, the following statement has been furnished us by the company:

In the first place President Duntley is not going to resign. It is due to his knowledge, energy and ability that the pneumatic tool business has grown to its present vast proportions. This is fully recognized by the directors, and none of them desires his resignation. The report that he does not have the confidence of Mr. Schwab or Mr. Matthiessen is entirely without foundation, and there is no justification in the report that he anticipates retiring or that any stockholders desire him to do so. The fact that Mr. Schwab has purchased from Mr. Pam the stock owned by the latter is true, and this transaction was a private one between them. It originated with them, and none of the other officers or stockholders had anything to do with it. Therefore Mr. Pam having sold all of his stock, it naturally followed that he should resign from the directory, which he has done entirely of his own accord. The above transaction is but one of the many which are continually passing between Mr. Schwab and Mr. Pam and has no significance whatever. The fact that Mr. Matthiessen is at present in Chicago is true, but he is not examining the accounts of the affairs of the company, simply attending to other affairs in which he is interested. The executive offices of the company are to be moved to New York, and it is due to this fact that some of the directors have tendered their resignations. Mr. Schwab is the largest stockholder in the company and has expressed a desire to take an active part in the direction of the company's business, as has also Mr. Matthiessen. Their action is entirely justified by their present holdings in the company, and as they both live in New York, it is necessary that the executive offices be located in that city.

As regards Messrs, Wacker, Chalmers and Lynch, these gentlemen agreed when they accepted places on the board that they would do so only if the executive offices were located in Chicago, as it would be impossible for them to attend meetings in New York City, as they could not take the time from their other affairs. Naturally, therefore, when they learned of the proposed change in location they were opposed to it, as they felt it impracticable for them to continue on the board and Executive Committee, and they accordingly tendered their resignations. In all probability the number of directors will be reduced from 15 to nine, as the members are widely separated, and it is difficult to obtain a quorum with the present number. The affairs of the company are in a most flourishing condition, and the prospects are exceedingly bright for them to continue so in the future. The various plants are working increased forces in order adequately to fulfill the requirements. Their foreign offices report a correspondingly cheerful outlook. The business for the month of August just past exceeded that transacted in August, 1902, and there is every indication that the present month will be very satisfactory as regards sales of pneumatic appliances.

The Great Northern Coal & Coke Company.

It is announced that the new railway from Columbus, Ohio, to Marysville, Ky., to connect east and west trunk lines with the Chesapeake & Ohio, Louisville & Nashville and other Southern lines, is to be extended 20 miles, from Maysville, through Jackson, Pike, Floyd and Martin counties in Kentucky, so as to form an outlet to the coal fields on the west side of the Big Sandy River. The Great Northern Coal & Coke Company, recently organized with a capital stock of $10,000,000, own 500,000 acres of coal lands in that district, and are said to be promoting the new railroad. They propose to ship coal by rail, as well as down the Big Sandy and Ohio rivers, and it is stated that the Great Northern and Pittsburgh Coal companies will control the track from Pennsylvania and all States along the Ohio River to New Orleans. Large elevators and tipples are to be erected at Maysville for transferring coal into barges for the trade along the Ohio and Mississippi rivers. It is stated that with connections at Columbus, Ohio, the company will also enter the lake coal trade. The Great Northern will have their land and railway headquarters in New York, their shipping headquarters at Maysville, and their selling headquarters at Cincinnati. The temporary organization includes J. N. Camden and Sprigg Camden of Parkersburg, P. I. Kimberly of Sharon, Pa.; F. A. Dinley and Robert Nomlon of Chicago, George C. Howe of Duluth, J. C. Mays of Paintsville, Ky., and members of an Eastern syndicate.

OBITUARY.

NICHOLAS B. LYONS.

On Monday, the 7th inst., Nicholas B. Lyons died at his home in Jersey City, N. J., after a protracted illness and steady failing of health, which extended over a period of more than two years. Mr. Lyons, who for many years has been one of the most prominent men in the machine tool trade, was in his fiftieth year, and spent the last 20 years of his life in the employ of the Bullard Machine Tool Company of Bridgeport, Conn. He was the company's New York sales manager, and in his travels made a wide circle of friends among the prominent manufacturing companies throughout the country and among his contemporaries as well. Prior to his illness he was extremely active, and although during the last two years his health was so poor as to prevent him from continuing his duties, the Bullard Company retained him in his position until the end. Stanley H. Bullard, who during the last two years has been virtually in charge of the New York office, will assume full control of that end of the company's business. Before his connection with the Bullard Machine Tool Company Mr. Lyons was identified with James Begs & Co., general machinery merchants.

NOTES.

HIRAM L. TRACY, sales agent of the Taylor Iron & Steel Company, died suddenly on August 29, in his office at 95 Liberty street, New York, while talking to his wife over the long distance telephone. Death was due to a stroke of cerebral apoplexy. Mr. Tracy was 63 years old and had been with the Taylor Company for five years, previous to which he was engaged in the car wheel business in Scranton, Pa.

CHARLES LOUIS VOLCKHAUSEN of C. L. Volckhausen & Co., New York, died at his home in this city August 27. He was born in Germany, April 8, 1837, came to America at an early age and served in the Union Army during the Civil War. He learned the business of cabinet makers' and builders' hardware in the establishment of A. Hammacher & Co., afterward associating himself with C. A. Stock at 118 Wooster street until 1881, when he went into business for himself. The business in West Third street will be continued by his son, who was his father's partner.

ROBERT C. BLACKALL, the consulting mechanical superintendent of the Delaware & Hudson Railroad Company, died at his home in Albany, N. Y., August 31, of heart disease. For half a century his name had been identified with railroads in constructive departments. He was born in 1831, and entered the railway service in 1850. Mr. Blackall was a prominent member of the American Railway Master Mechanics' Association, of which he was president during the years 1895-1896.

ADAM C. BRINSON, a member of the Perkins Mfg. Company, and secretary of the Georgia Iron Works of Augusta, Ga., died in that city August 24, from the effects of an operation for appendicitis, aged 50 years.

RICHARD BROWN, a pioneer iron manufacturer of the Mahoning Valley, died on September 8 at his home in Youngstown, Ohio, at the age of 75. Mr. Brown was one of the organizers of the Brown-Bonnell Rolling Mill Company, one of the oldest iron works of the Valley, now a part of the Republic Iron & Steel Company. He was president of the Board of Trustees of Mount Union College, Alliance. He is survived by a widow.

Pig Production Increased.

Stocks Gradually Growing.

The month was marked by many changes in the condition of blast furnaces. Seldom have so many furnaces been blown in and out in one month. The preponderance numerically is in favor of those blown in. Among them were four new stacks, which were put in blast for the first time—namely, the Adrian at Dubois, Pa.; the Cleveland, the No. 2 Calumet at South Chicago, and the Gadsden-Alabama. Quite a number of Southern furnaces which had been blown out or banked during the labor troubles with the coal miners, resumed operations during August. The coke or anthracite furnaces blown in, in addition to the new ones named, were the Franklin, Buffalo B, Temple, Fannie, Sharpsville, Marshall, one Cambria, Benwood, one Etna, one Hubbard, Hannah, two South Chicago, Citico, one Sloss, Talladega, Tuscaloosa, and two Woodward. Those blown out were the second Poughkeepsie, one Bethlehem, one Duquesne, one Lucy, one Newcastle, Sharon, Sharon Steel Company, one Shenango, one Maryland, Graham, Covington, Princess, West End, Greensboro, one Dayton, Standard, one Ohio, Mayville and Zenith. The charcoal furnaces blown in were the Chatham, Buffalo C, White Rock and Dover, while those blown out were the Eagle, Bloom and Fruitport.

The production for the month of August shows an increase on that of July. The increase was not large, but a decrease had been expected. The figures are as follows, compared with previous months:

Monthly Pig Iron Production.

	April, (30 days)	May, (31 days)	June, (30 days)	July. (31 days)	August, (31 days)
New York	42,069	47,330	49,762	44,137	39,154
New Jersey	19,998	20,908	18,383	19,533	19,535
Schuylkill	45,234	47,973	46,550	41,143	45,759
Lehigh	61,286	67,409	62,972	60,861	56,540
Susq. and Lebanon	53,782	62,294	60,905	57,920	60,758
Pittsburgh	362,747	415,518	420,946	402,779	405,595
Shenango	127,985	132.208	118,743	108,234	88,484
West. Penn.	97.294	92,016	94,742	91,570	101,678
Md., Va. and Ky.	93,039	92,106	82,448	80,214	70,874
Wheeling	69,743	73,657	85,531	86,916	75,582
Cent. and No. Ohio	110,017	122,442	127,668	105,127	110,426
Mahoning V.	129,988	114.361	110,347	98,541	117,217
Hanging Rock and Hocking Valley	36,929	37,923	29,537	28,186	31,329
Ill.,Wis.,Minn., Mo. and Col.	199,685	219,666	207,023	201,386	212,578
Alabama	117,372	125,863	117,761	81,439	104,357
Tennessee, No. Carolina and Georgia	41,263	41,340	39,910	38,198	33,782
	1,608,431	1,173,614	1,673,228	1,546,184	1,573,648
Charcoal pig.	37,611	42,352	43,678	44,432	42,995
Totals	1,646,042	1,755,966	1,716,906	1,590,616	1,616,643

Production estimated for August, 34,225 tons.

There has been an increase in the capacity of the furnaces in operation, as is shown by the following table of the weekly capacity of these furnaces in blast on September 1:

	Total capacity per week. Gross tons.	Coke capacity per week.	Charcoal capacity per week
September 1, 1903	370,833	361,097	9,736
August 1	362,330	353,681	8,649
July 1	395,042	384,825	10,217
June 1	398,139	388,178	9,961
May 1	381,697	373,496	8,201
April 1	376,576	368,215	8,361
March 1	354,733	347,424	7,309
February 1	343,111	335,339	7,772
January 1	353,800	346,073	7,727
December 1, 1902	343,817	336,617	7,200
November 1	337,559	330,110	7,449
October 1	345,048	337,837	7,211
September 1	335,189	328,243	6,946
August 1	336,465	328,745	7,720
July 1	310,950	303,793	7,157
June 1	344,748	337,492	7,256
May 1	352,064	337,627	6,437
April 1	337,424	331,140	6,284
March 1	323,028	316,039	6,989
February 1	332,045	325,440	6,605
January 1	298,460	291,992	6,468
December 1, 1901	324,761	317,358	7,403

Production of Steel Companies.—Returns from all the plants of the United States Steel Corporation, the Cambria, Pennsylvania, Maryland, Lackawanna, Wheeling, Ashland, Republic, Jones & Laughlin, La Belle, Bethlehem and Colorado companies show a total product of 998,064 tons for August, as compared with 987,855 tons in July, 1,021,839 tons in June, 1,037,325 tons in May and 966,850 tons in April.

Production of Spiegeleisen.—The production of spiegeleisen and ferromanganese was 15,342 tons in August, as compared with 14,933 tons in July, 16,309 tons in June, 17,600 tons in May and 17,555 tons in April.

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	September 1. Number of stacks.	Number in blast.	Capacity per week.	August 1. Number in blast.	Capacity per week.
New York	17	9	11,503	10	10,677
New Jersey	7	6	4 216	6	4,425
Spiegel	3	1	190	1	166
Pennsylvania:					
Lehigh Valley	27	22	12,661	23	13,523
Spiegel	1	1	95	1	99
Schuylkill Valley	13	12	10,313	10	9,085
Low. Susquehanna	10	7	8,043	7	7,431
Lebanon Valley	12	7	5,697	7	5,565
Pittsburgh District	37	33	89 928	34	89,300
Spiegel	2	2	1,293	3	1,637
Shenango Valley	19	13	19,305	15	23,974
Western Penn.	19	19	23,551	16	20,677
Maryland	5	3	5,894	4	7,366
Wheeling District	12	11	19,689	10	19,626
Ohio:					
Mahoning Valley	15	13	24 289	12	24,883
Cent. and North	16	14	25,888	13	23,738
Hocking Valley	3	2	679	2	1,000
Hanging Rock	12	9	6,115	8	6,051
Illinois	19	18	37,609	15	33,031
Spiegel	2	2	1,515	2	1,375
Minnesota	1	0	0	1	1,247
Wisconsin	5	4	4 147	5	4,321
Missouri	1	1	770	1	792
Colorado	4	4	4,875	4	4,706
Spiegel	1	0	0	0	0
The South:					
Virginia	23	13	8,828	17	9,328
Kentucky	8	3	1,529	3	1,400
Alabama	41	30	24,972	24	20,140
Tennessee	16	12	6,761	13	7,065
Georgia	1	1	742	1	774
North Carolina	1	0	0	1	279
Totals	353	272	361.097	269	353,681

Charcoal Furnaces in Blast.

Location of furnaces.	September 1. Number of stacks.	Number in blast.	Capacity per week.	August 1. Number in blast.	Capacity per week.
New England	7	2	185	2	185
New York	3	3	910	1	54
Pennsylvania	5	2	64	3	114
Maryland	1	0	0	1	0
Virginia	4	2	88	1	54
Ohio	8	3	185	4	200
Kentucky	3	0	0	3	0
Tennessee	2	2	115	1	70
Georgia	4	3	828	3	890
Alabama	5	4	1,211	4	1,182
Michigan, Missouri and Wisconsin	14	11	5,868	12	5,646
Texas	4	1	282	1	254
Totals	60	33	9,736	36	8,649

Stocks.

The position of furnace stocks sold and unsold, as reported to us, was as below on September 1, as compared with the preceding months, the same furnaces being represented as in former months. This does not include the holdings of the steel works producing their own iron:

Stocks.	April 1.	May 1.	June 1.	July 1.	August 1.	Sept. 1.
Anthracite and Coke	156,732	147,312	182,665	234,425	311,174	354,784
Charcoal	14,025	15,430	20,738	22,585	31,289	45,305
Totals	170,757	162,742	203,403	257,010	342,463	400,089

The Illinois Metal Company of Granite City, Ill., have secured the agency for the sale of the product of the Rome Brass & Copper Company, Rome, N. Y., which includes sheet brass, sheet copper, rivets, &c. They will also act for the United Sheet & Tin Plate Company, Marietta, Ohio, selling tin plate, black plate and galvanized iron. An office in the city of St. Louis will be opened.

MANUFACTURING.

Iron and Steel.

The Marshall Furnace, at Newport, Pa., was blown in August 10.

The Poughkeepsie Furnace, Poughkeepsie, N. Y., was blown out August 30.

The Cambria Steel Company of Johnstown, Pa., are turning out for the United States Government the structural steel required for the frames of the battle ships "Massachusetts" and "Vermont." The order aggregates 15,000 tons. The nickel steel order placed with the company is about 10 per cent. of the total amount contracted for by the Navy Department.

The Embree Iron Company, Embreeville, Tenn., expect to blow in the Embree Furnace the latter part of this month.

The Vanderbilt Furnace, Birmingham, Ala., was blown in last week.

The Alabama Consolidated Coal & Iron Company, Birmingham, Ala., blew in their new furnace August 23.

The South Chicago Furnace Company blew in their Calumet Furnace No. 2 August 6.

The Zenith Furnace Company, West Duluth, Minn., blew out the Zenith Furnace August 12 for lining and repairs.

The Bloom Furnace, at Bloom Switch, Ohio, was blown out August 23 for repairs.

Sharon Furnace, Sharon, Pa., was blown out August 8 for repairs.

Shenango Furnace No. 3, Sharpsville, Pa., was blown out August 28 for new lining and general repairs.

The Chatham Furnace, Chatham, N. Y., was blown in August 22.

Franklin Furnace, Franklin Springs, N. Y., was blown in August 12.

Adrian Furnace, Du Bois, Pa., was put in blast August 10.

The Cleveland Furnace Company of Cleveland, Ohio, blew in their Cleveland Furnace on August 21.

No. 3 furnace of the Pennsylvania Steel Company at their North Lebanon plant, Lebanon, Pa., was blown out September 5 for repairs that will probably require six months. The furnace has not been out of blast since it was built, four years ago. The ovens will be relined and a 25-foot addition will be built to the ore roasters. No. 1 furnace is in blast and is making a good product

The Celeron Steel Company, Celeron, N. Y., have incorporated with a capital stock of $50,000 for the manufacture of cold pressed steel grading scrapers. The company have acquired a plant and start business with a capital of $10,000. The directors are Ziba L. Squier and Jerome M. Hobart.

Furnace No. 2 of the Tennessee Coal, Iron & Railroad Company's furnaces at Ensley, Ala., has been blown in, making five in all now in operation there and 11 in the immediate Birmingham district belonging to the same company. The furnace just blown in was recently repaired at the cost of $30,000, excluding the cost of relining Its daily capacity will be between 100 and 200 tons of iron.

Improvements to the amount of $100,000 and consisting partly of new engines and boilers, are being made to the American Steel & Wire Company's plant at Anderson, Ind., and 800 employees await the completion of the work.

The American Tin Plate Company will have in operation this week the entire 30 mills in the Shenango works, at New Castle, Pa., ten of which have been idle for some time on account of a fire.

The Pennsylvania Engineering Works, New Castle, Pa., have received a contract for all the iron work for a new blast furnace to be built by the Carnegie Steel Company, at New Castle, Pa. The Pennsylvania Engineering Works are builders of blast furnace and steel plant construction, general engineering and plate work and iron and steel cars, and have a large number of orders on their books.

General Machinery.

The Pratt & Whitney Company, Hartford, Conn., have completed the various additions to their plant which were commenced last year and delayed by labor troubles and the difficulty of getting material. The plant has been reorganized and additional machinery is being installed as fast as the company can build it. With the perfecting of all the new machines and designs which they have in view at the present time, the number of employees will be increased from 1000 to 1500. The company are not in the market for any machinery.

The Kentucky Gear & Machine Company, Louisville, Ky., recently incorporated, have arranged to build a good sized plant at South Louisville for the manufacture of a gear cutting machine, invented a short time ago by George Binder, and gear wheels. The machine will cut gear wheels from 1 inch to 25 feet in diameter. The company are supplied with sufficient machinery, but desire quotations from manufacturers on large lots of malleable iron and steel castings for gear wheels. The officers are G. Binder, president; Aug. A. Butterweck, vice-president; Julius A. Stege, secretary, and G. E. Butterweck, treasurer.

The Hill Tool Company, Anderson, Ind., say that business is holding up remarkably. They expect to add more machinery to their equipment this fall to better enable them to take care of increasing business.

The Chicago House Wrecking Company, Chicago, state that trade in machinery has been exceptionally good during the past 30 days. Their orders are running mostly in large units among prominent saw mills throughout the south. They have also done a very nice business among electric light and power stations. Business during the month of August has been of a much greater volume than during the corresponding month of last year. They regard the outlook for future business as very bright. They are receiving many inquiries for complete plants and are in position to submit quotations in almost every case. They note a number of very promising inquiries from foreign countries, including the Philippine Islands, India and South Africa.

The Wray-Austin Machinery Company, Detroit, Mich., who recently suffered to the extent of $5000 through loss by fire to machinery and building, have rebuilt their works, purchased and installed new equipment, and are now in better position than heretofore to handle the increasing trade in their line of pulleys.

The Buffalo Forge Company have recently furnished for the Italian Navy six 72-inch cone wheels, each one direct connected to an 8 x 8 inch vertical cylinder below shaft Buffalo engine of special design. These wheels, with a speed of 350 revolutions per minute, are guaranteed to have a capacity of 400 cubic feet per second and to maintain a pressure of 3½ inches water gauge. The same company have also recently supplied for the Cincinnati & Columbus Traction Company two steel plate, three-quarter housing, up-discharge fans, having blast wheels 141 inches in diameter by 53 inches in width at the periphery. The fans are constructed of extra heavy steel plate thoroughly braced, cast iron spider with heavy T iron braces for the wings being employed. The blast wheels have a slight taper from the center of the periphery, having the narrowest part at the periphery. These fans have shafts 5¾ inches in diameter to which the blast wheels are keyed. The blast wheels are overhung, the shaft having two bearings on the pulley side of the fan, the bearing next to the fan being water cooled. The fans are driven by Reynold's silent chain drive and are used in connection with Green fuel economizers, which will add materially to the efficiency of the installation. Each fan is guaranteed to be capable of taking care of 2000 boiler horse power and to give a draft of 1-7-10 inches water gauge at the intake of the fan when run at a maximum speed of 175 revolutions per minute.

The business of the Mossberg & Granville Company of Providence, R. I., is about to be reorganized. Frank Mossberg of Attleboro, Mass., who was formerly active in the management, will return to the company and participate in the direction of their affairs. Following the failure the business was bought by John T. Maguire, one of the owners of the Manufacturers' Building, in which the shops are located. Mr. Maguire bought for men who are about to organize a new corporation, which will probably have a new name. The manufacture of wire drawing machinery will be abandoned and the energies of the company will be devoted to pushing the jewelry machinery and roller bearing ends of the old business. L. M. Lincoln and H. H. Ricker remain with the business. Mr. Lincoln formerly acted as assistant manager and Mr. Ricker was the company's salesman. Work of overhauling the shops is now going on. Everything will be in first-class shape. The present quarters will be continued for the present at least.

The Marine Railway, Machine & Boiler Works, Baltimore, Md., have incorporated with a capital stock of $10,000. Vernon V. Codd is general manager.

The American National Machine Works, Goshen, Ind., have fitted up part of their plant for the manufacture of wire fence. While the company have the necessary machinery to fill present orders, they inform us that they will probably need a few more presses and some other machinery in the near future.

The Scranton Steam Pump Company of Scranton, Pa., have purchased the plant of the Poore Pump Company, also of Scranton, Pa. The property was inventoried at $45,000 and was sold at a sacrifice on account of dissatisfaction among the stockholders on account of meager earnings. This makes three plants the Scranton company are now operating, employing 400 hands in Scranton and 100 in Kingston.

The Turners Falls Machine Company, Turners Falls, Mass., who last March succeeded to the plant and business of the Clark Machine Company, are moving into their new building, 50 x 125 feet, two stories. Some new machinery has been purchased, including a 36-inch radial drill and a 10-foot boring machine. The Skinner Electric Company of Gardner, Mass., furnished three motors and a 50 horse-power generator, which will be operated by one of the company's water wheels. Besides water wheels they manufacture paper mill machinery, shafting, iron and brass castings, &c.

The addition, 50 x 205 feet, to be built to the plant of the Warner & Swasey Company, Cleveland, Ohio, is to be used as an erecting shop and will be equipped with electric traveling cranes. It is expected that the new building will be completed by the middle of October.

The Louisiana & Texas Division of the Southern Pacific Railroad will erect a roundhouse at Algiers, La. Other addi-

tions and improvements at that point are contemplated, but have not yet been decided upon. J. J. Ryan, superintendent of motive power, informs us that during the past three years the company have added considerably to their shop tools and machinery, and do not contemplate any extensive purchases in the near future.

Power Plant Equipment.

H. L. F. Trebert & Co. and the Morris & Corkhill Company of Rochester, N. Y., have consolidated as the Trebert Gas Engine Company. The company have a fully equipped plant and manufacture water cooled and air cooled motors for automobiles, marine and stationary gas engines, transmission gears, &c. The officers are H. L. F. Trebert, president and manager, and J. Geo. Wagner, Jr., secretary and treasurer.

The General Electric Company, Schenectady, N. Y., have received an order for electric equipment for the Insein shops of the Burmah Railway, in India. The equipment includes power and lighting, and also fans to replace the old punkahs.

To secure larger facilities for the building of engines and boats, the D. M. Tuttle Company will increase their capital stock to $60,000 and move their plant from Canastota to Baldwinsville, N. Y., where they have secured a site. The citizens of the latter town have subscribed for a considerable amount of stock, and the plant to be erected will be much larger than the present one.

John A. Caldwell, general sales manager of the Wilkinson Mfg. Company, 45 Broadway, New York, reports the following recent sales of automatic stokers: Two 200 horse-power, Ridgway, Pa., Machine Tool Company; four 175 horse-power, Reading, Pa., Water Works; ten 375 horse-power, Pittsburgh Plate Glass Company; three 350 horse-power, Chamber of Commerce Building, Rochester, N. Y.; two 200 horse-power, New Willard's Hotel, Washington, D. C.; 13 300 horse-power, Federal Sugar Refining Company, Yonkers, N. Y.; two 300 horse-power, Schwarzchild & Sulzberger, New York; ten 200 horse-power, Belleville & Stratford Hotel, Philadelphia; ten 200 horse-power, American Tube & Stamping Company, Bridgeport, Conn.

The J. W. Ruger Mfg. Company, Buffalo, N. Y., manufacturers of gas and gasoline engines, bakers' machinery, &c., have recently completed a brick addition to their plant at Perry and Chicago streets and equipped it with considerable new machinery.

Dravo, Doyle & Co., Lewis Block, Pittsburgh, representatives of the Ball Engine Company, Erie, Pa., have received an order from the National Tube Company, Pennsylvania department, for a 700 horse-power horizontal cross compound Corliss engine direct connected to alternator.

Foundries.

Negotiations are on for the lease by the Le Baron Iron Foundry of Middleboro, Mass., of a portion of the Billings-Clapp property at Mt. Hope Bay, R. I., owned by William J. Dunn of Fall River. The Le Baron people wish to be on tidewater and on the railroad. A branch of the New York, New Haven & Hartford Railroad passes the Mt. Hope Bay site, which has a long water front.

The White-Warner Company of Taunton, Mass., will make large additions to the plant of the Taunton Iron Works, which they purchased soon after their recent fire which destroyed their old foundry. The old structure will not be rebuilt, and future growth will be at the Taunton Iron Works, where there is ample room for large additions. It is expected that work will begin soon after the new year.

The Kentucky Gear & Machine Company, Louisville, Ky., desire quotations on large lots of malleable iron and steel castings for gear wheels. *See General Machinery.*

The Reeves Engine Company, Trenton, N. J., who are erecting a new foundry, 64 x 127 feet, with wings at each end, 26 x 28 feet, have purchased one pressure blower and one rumbler from the J. W. Paxson Company, Philadelphia; one cupola, one crane, elevator, ladles and core ovens from the Whiting Foundry Equipment Company, Harvey, Ill.

Fires.

The Ideal Stove & Foundry Company's plant, at Daleville, Ill., was destroyed by fire September 7, entailing a loss of about $100,000.

The pulp mills of E. F. Spaulding, Newport, Vt., were destroyed by fire September 7. The loss is estimated at $20,000.

The Walker Carriage Company's plant, at Merrimac, Mass., was damaged $25.000 by fire September 3.

The paint and tar paper factory of the H. W. Johns-Manville Company in Brooklyn, N. Y., was recently damaged $35,000 by fire.

The round house and machine shop of the Atchison, Topeka & Santa Fé Railroad were destroyed by fire August 23. The loss is estimated at $100,000, including about $20,000 worth of machinery.

The plant of Parsons, Rich & Co., Newton, Iowa, manufacturers of gasoline engines and self feeders, was recently destroyed by fire. The loss is placed at $60,000.

A recent fire at Troy, N. Y., did $150,000 damage. The plants of the Aird-Don Company, formerly the Cohoes Tube Works; the machine shop of John Hidley, and the furniture factory of George W. Slyter were burned to the ground.

The tube mill of A. M. Byers & Co., Incorporated, on the South Side, Pittsburgh, was damaged by fire to the extent of about $50,000 on Sunday morning, September 6. The firm will immediately rebuild the plant.

Hardware.

Twenty-eight tackers, employed by the Atlas Tack Company, at Fairhaven, Mass., went on strike September 1 because of a new schedule of wages, which put them on piece work, added about 20 per cent. to the number of tack machines which each tacker must care for, and also put the feed boys on piece work. The company declare that the strikers will not be given work again in their shops. It is stated by the company that the production of their tack department did not warrant the old schedule of wages. There are seven departments in this factory. Six of them are on a profitable basis. The tack department was not. So President Weymouth worked out a new schedule which he believes will give greater production without decreasing the wages of workmen much, if any. President Weymouth thus expresses the position of the company: "Our old men have discharged themselves and are no longer employees of the Atlas Tack Company. We had several consultations and I explained to the men in full the conditions under which we were working. I asked of them no more than other manufacturers require. We have seven departments here and in six of them we are making money. In the seventh, the tack making, we are not. I asked the men to run more machines and make a new schedule. They refused and did not return to work. That ended the incident. We are now engaging new men to take their places."

The Morse Twist Drill & Machine Company of New Bedford, Mass., are making extensive additions to their shops. Two stories are being added to a one-story building 40 x 170 feet, and three stories to a one-story building 40 x 75 feet. The purpose of both these enlargements is to permit of the expansion of several manufacturing departments. A new one-story planer room, 30 x 40 feet, will also be built. Other enlargements are a new boiler house and stack, and an addition to the engine room. New electrical equipment will be installed.

The Dow Wire Works Company, Louisville, Ky., have secured a factory located on 3 acres of ground with railroad switch in the city limits on improved streets. Their facilities will be largely increased, since they will now have about 75,000 square feet of floor space. The company have already purchased two large boilers and engine, also shafting and heating apparatus, which are now in place, and they expect to get their machinery moved within the next 60 days.

Miscellaneous.

The Wason Mfg. Company of Springfield, Mass., have the contract for 100 of the 500 new cars for the Interborough Railway, New York. These cars have fire proof features, which were given additional attention because of the recent tunnel tragedy at Paris. The cars are partially copper sheathed to the window sills. Slow burning woods and fire proof paints are used. Every wire must be contained in a specially molded fire proof metal conduit. On the bottom of the cars will be an asbestos covering, and three floors will have layers of asbestos between them. There will be a steel plate over each motor. The cars will be 51 feet, 2 inches over buffers. The Wason company have completed their contract for copper sheathed cars for the New York, New Haven & Hartford Railroad. The Osgood, Bradley & Sons Company of Worcester, Mass., are now building a number of the same type of copper sheathed cars for the New Haven road.

F. L. & J. C. Codman, manufacturers of buffing and polishing wheels, at South Bosfon, Mass., have taken new quarters in one of the industrial buildings adjacent to that recently destroyed by fire, in which the Codman plant was wiped out. The firm made a record for themselves, for on Saturday evening, after the Tuesday of the fire, they were making shipments. In 32 hours after the fire 20 girls were at work and new goods were being produced, so that the firm's customers will suffer no inconveniences in shipments. The dies destroyed in the fire were the most serious loss.

The Hersey Mfg. Company, manufacturers of water meters and machinery, at South Boston, Mass., have bought a tract of land adjacent to their property, and propose to build upon it in the near future. The present plant is rushed to its utmost capacity, every available foot of space being utilized, until it has become necessary that additional manufacturing facilities be provided.

Among the number of other orders received recently by the Apex Equipment Company, New York, are the following: Specially constructed standard gauge hopper bottom cars, and some 6-yard capacity standard gauge, two-way dump cars, for the Ballston Terminal Railway Company, and special flat cars for the Conneaut & Erie Traction Company. They are also building for export to the Philippine Islands, to be used in the harbor improvement work for the United States Government, 20 specially constructed all steel flat cars. One feature of these cars is their equipment with the John W. King patent steel under frame.

Barnhardt & Davis, Warren, Pa., on July 20 commenced the erection of a new building, 40 x 70 feet, of two stories, in which to do general repair and jobbing work in brass and iron; also to make and furnish shafting, foundry patterns, iron and wood pulleys, boxes, hangers, and saw mill machinery. They are now running full.

The car repair shops of the Fall Brook Division of the New York Central Railroad, at Lyons, N. Y., which have been closed for a number of years, were reopened last week.

The Deering Division of the International Harvester Company are building a plant at Hamilton, Ont., for the manufacture of agricultural implements far the Canadian market. The site covers 7 acres and is located on the shore of Lake Ontario. Over 2000 men will be employed, and an industrial village with houses for the workmen will be built by the company adjacent to the plant.

At the works of John Ellis & Co., in Warren, Pa., there is being built an oil car that will have a capacity of 13,000 gallons, or 100,000 pounds. The car is said to be the largest of its kind ever built, and will be used by the Valvoline Oil Company.

A company with a capital of $200,000 are to be organized at Hagerstown, Md., for the manufacture of automobiles. Among those interested are W. H. McCardell, V. M. Cushwa, S. H. Welhenmayer, J. K. Hoffman, Louis Rose, R. T. Edmonds and Henry H. Keedy, Jr., all of Hagerstown. The machine to be manufactured will be the Crawford automobile, which has just been perfected by Robert S. Crawford of Philadelphia, manufacturer of the Crawford bicycle and founder of the Crawford Works of Hagerstown.

The Energy Elevator Company, Philadelphia, are very busy. Among various elevators shipped and completed there may be mentioned an electric elevator for Moore & Sinnott, Philadelphia, Pa.; a wagon lift for Kregar Falls, Minn.; a cot lift for the Germantown Hospital, this city, and a trunk lift for Pavilion, N. Y., parties. Freight elevators have also been shipped to Struthers, Ohio; Stoughton, Wis.; Salem, Mass.; Sheffield, Ala.; Sharon, Pa.; Hagerstown, Md.; Elgin, Ill.; Weatherly, Pa., and to a number of local parties.

It is officially announced that negotiations have been entered into to consolidate two or three large interests with the Racine-Sattley Company, one of them being a steel plant, but nothing definite has been consummated. The Racine-Sattley Company were recently organized by the merging of the Racine Carriage & Wagon Company, Racine, Wis., and the Sattley Company of Springfield, Ill.

The Ava Chemical Company of New York, recently incorporated at Washington, D. C., will erect a factory at Niagara Falls for the manufacture of standard chemicals and will establish several depots for their products throughout the United States and Canada. John D. Rockefeller is one of the most largely interested stockholders.

By the incorporation of the Du Bois Southwestern Railroad Company the Goodyear interests of Buffalo propose to extend the Buffalo & Susquehanna Railroad, which they own, 50 miles southward in Pennsylvania, through Jefferson, Indiana and Armstrong counties, to mining properties recently acquired. This road has been growing in importance during the past few years, and a new connecting line with terminals at Buffalo is now being built which will bring coal and coke to the new blast furnaces being erected at Buffalo by the Goodyear interests—the Buffalo & Susquehanna Iron Company.

The B. F. Smith Company of Pawtucket, R. I., have been awarded the contract for the new $400,000 cotton mill of the Blackstone Mfg. Company at North Smithfield, R. I.

The American Emery Wheel Company of Providence, R. I., are about to begin work on an addition to their plant which will almost if not quite double their capacity, a step made necessary by the constant increase of their business. The new building will be of brick, two stories, and 34 x 116 feet on the ground. In addition they will erect a brick engine and boiler house 26 x 27 feet. New machinery and fixtures for the manufacture of emery and corundum wheels will be installed immediately upon the completion of the addition. This addition will be the third considerable increase since the erection of the company's main building in 1898.

The F. W. Dunnell Composite Leather Company of Springfield, Mass., have leased the Crossman factory in West Warren, Mass., and will begin the manufacture of their goods there about the 15th inst. The factory has been overhauled and new machinery installed. The company manufacture by a patented process railroad ties, paving blocks, fence posts and other articles. The officers of the company are: President, Edwin B. Woodin; vice-president, Frank M. Horr; secretary, Elva H. Young; treasurer, Fred. W. Dunnell.

Dr. Oskar Nagel has established an office and laboratory at 90-96 Wall street, New York, where he will be pleased to receive consultation on all matter pertaining to chemical engineering, erecting of chemical plants, method of utilization of wastes, and research work.

The Great Lakes International Commission.

It is now known to a certainty that the British Government will co-operate with the United States Government, through a commission, to determine what is best to do in regard to preserving the levels of the great lakes. On June 13, 1902, a rivers and harbor act approved provided as follows:

That the President of the United States is hereby requested to invite the Government of Great Britain to join in the formation of an international commission to be composed of three members from the United States and three who shall represent the interests of the Dominion of Canada, whose duty it shall be to investigate and report upon the conditions and uses of the waters adjacent to the boundary lines between the United States and Canada, including all the waters of the lakes and rivers whose natural outlet is by the River St. Lawrence to the Atlantic Ocean; also, upon the maintenance and regulation of suitable levels. . . . The said commissioners shall report upon the advisability of locating a dam at the outlet of Lake Erie, with a view to determining whether such dam will benefit navigation, and, if such structure is deemed advisable, shall make recommendations to their respective Governments looking to an agreement or treaty which shall provide for the construction of the same, and they shall make an estimate of the probable cost therefor.

Congressman Alexander of Buffalo is in receipt of a letter from the State Department at Washington informing him that a letter has been received from the British Foreign Office in which it is stated that "Steps will be taken at once for the appointment of the Canadian commissioners." This shows that the subject of the regulation of the levels of the great lakes has appealed to the British Government, and that before many months have passed the important international commission will be at work. They will undoubtedly visit Niagara to study the power development at that point, and both the United States and Canadian commissioners will be much interested because of the extensive works on both sides of the river. To regulate the flow of the river over the proposed dam at Buffalo, in order that the falls of Niagara may not be destroyed and the great turbines of Niagara lessened in the revolutions, will be a mammoth problem.

La Belle Iron Works.—At a meeting of the stockholders of the La Belle Iron Works, Steubenville, Ohio, held in Wheeling, W. Va., on September 8, it was decided to increase the number of directors from seven to eleven. The new directors elected are as follows: A. J. Clarke, Wheeling; A. H. Woodward, Birmingham, Ala.; C. A. Robinson, Wheeling; H. C. Franzhein, Wheeling; A. F. List, Wheeling; J. E. Wright, Steubenville; D. J. Sinclair, Steubenville; C. W. Bray, Pittsburgh; E. W. Mudge, Pittsburgh; George Greer, New Castle; W. F. Foltz, New Castle. The new board will meet next week to elect officers.

John Humphrey, of Keene, N. H., manager of the Humphrey Machine Company, died on August 24 of a complication of diseases. He had been in poor health for a year. He was born in Lyndon, Vt., October 12, 1834, and started out to earn a living when 12 years old. He studied mechanical engineering and hydraulics, becoming an expert in the construction and designing of water wheels. He began the manufacture of water wheels 30 years ago, and many of the power wheels in large New England manufacturing establishments were designed and built by him. He invented machines for making shoe pegs and clothespins. Another important invention was a lumberman's log caliper, which computed the contents of logs in cord and board measure.

A cable dispatch from Swansea, Wales, states that the lockout in the tin plate industry in South Wales, due to a long standing wages dispute, which began on August 29, terminated September 7, as the result of a decision reached at a joint meeting of the masters and men to refer all the questions in dispute to arbitration. Forty-one works which were affected by the lockout will reopen this week. Between 20,000 and 30,000 men were involved.

The Cincinnati Fall Festival was inaugurated at 10 o'clock on the morning of September 7, and will last two weeks. It is stated that the exposition is by far the best yet given.

The Iron and Metal Trades.

Our monthly blast furnace statistics are somewhat surprising, as they show an increase in the production of Pig Iron which is in marked contrast with conditions as reported last month. The August production of Anthracite and Coke Pig Iron was 1,573,648 tons, which is an increase of 27,464 tons as compared with July, when the product was 1,546,184 tons.

An unusual number of changes occurred in the condition of blast furnaces during the month, many having blown out for repairs, while quite a number of the Southern furnaces, which had been affected by the coal miners' strike in that territory, blew in again. The preponderance, however, was in favor of the furnaces blowing in. During the month four new stacks were put in blast for the first time—namely, the Adrian, at Du Bois, Pa.; the Cleveland, at Cleveland, Ohio; the No. 2 Calumet at South Chicago, and one at Gadsden, Ala. The anthracite and coke furnaces in blast on September 1 had a capacity of 361,097 tons a week, as compared with 353,681 tons on August 1.

The enlarged production of Pig Iron has not been accompanied by a heavy increase in stocks of iron unsold, as might have been expected. The increase in Anthracite and Coke stocks was only 43,610 tons. This shows that consumption is still proceeding under high pressure. In confirmation of this our market reports show that in some sections of the country an urgent demand exists for Pig Iron on spot or for quick shipment. This, however, does not apply to all sections, as complaint comes from the South that furnace companies are finding considerable trouble in getting some of their customers to take iron which had been sold at higher prices. But it may be said that it often happens that the very people who are thus repudiating contracts are purchasing Iron from other parties at lower prices, so that this does not really indicate a reduction in consumption.

The Southern railroad companies last week considered the application of Southern Pig Iron manufacturers for reduced freight rates on Pig Iron, but decided adversely. It is likely that as the railroads of that section are even now suffering from a shortage of cars to move cotton and other products the consideration of a lower freight rate on Pig Iron will be deferred until a more urgent necessity appears for taking such action. The adverse action may be regarded as distinctly favorable to Northern Pig Iron manufacturers, who are thus temporarily saved from increased competition.

Chicago reports large contracts placed by agricultural implement manufacturers for Soft Center Plow Steel for future delivery, some of the contracts extending over five years. A material concession in prices was made for which the keen competition of independent mills was responsible. This class of product is made by Crucible Steel works.

Deliveries can now be made very promptly in every branch of finished product, with the exception perhaps of large sizes of Merchant Pipe. This is a feature which should be appreciated by consumers, who not long since were compelled to pay premiums on anything desired for early delivery.

A meeting of manufacturers of Steel Bars was held in Pittsburgh on Tuesday, at which the price of Bars was reaffirmed at 1.60c., Pittsburgh. It was decided that it would not be advisable to reduce prices, notwithstanding the fact that the lower price at which Bar Iron is selling is diverting much tonnage from Steel to Iron.

The West reports a somewhat better inquiry for Steel Rails for 1904 delivery.

The tonnage in Sheets is improving. This is a branch of trade which has for some time been suffering from a slack demand.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Sept.9, 1903.	Sept.2, 1903.	Aug.12, 1903.	Sept.10, 1902.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	*$16.25*	$16.50	$16.75	$22.00
Foundry Pig No. 2, Southern, Cincinnati	*14.75*	14.75	15.25	21.75
Foundry Pig No. 2, Local, Chicago	*16.00*	16.50	17.25	23.00
Bessemer Pig, Pittsburgh	*17.35*	17.35	18.85	21.75
Gray Forge, Pittsburgh	*15.50*	15.50	16.00	21.25
Lake Superior Charcoal, Chicago	*19.00*	19.00	21.00	26.00
BILLETS, RAILS, &c.:				
Steel Billets, Pittsburgh	27.00	27.00	27.00	29.00
Steel Billets, Philadelphia	28.00	28.00	28.00	27.00
Steel Billets, Chicago	28.00	28.00	28.00	30.50
Wire Rods, Pittsburgh	35.00	35.00	35.00	36.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL:				
O. Steel Rails, Chicago	*14.50*	14.50	16.50	18.50
O. Steel Rails, Philadelphia	*16.00*	16.50	18.00	21.50
O. Iron Rails, Chicago	*18.00*	18.00	18.50	25.00
O. Iron Rails, Philadelphia	*19.00*	19.00	19.50	24.00
O. Car Wheels, Chicago	*21.00*	21.00	21.50	21.00
O. Car Wheels, Philadelphia	19.00	19.00	19.00	20.00
Heavy Steel Scrap, Pittsburgh	*17.50*	19.00	19.00	....
Heavy Steel Scrap, Chicago	*14.00*	14.00	15.00	18.50
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia	1.60	1.60	1.55	1.92
Common Iron Bars, Chicago	*1.55*	1.55	1.60	1.90
Common Iron Bars, Pittsburgh	1.60	1.65	1.60	1.80
Steel Bars, Tidewater	1.73½	1.70	1.70	2.00
Steel Bars, Pittsburgh	1.60	1.60	1.60	1.60
Tank Plates, Tidewater	1.78	1.78	1.78	2.00
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.75
Beams, Tidewater	1.73½	1.73½	1.73½	Nom.
Beams, Pittsburgh	1.60	1.60	1.60	Nom.
Angles, Tidewater	1.73½	1.73½	1.73½	Nom.
Angles, Pittsburgh	1.60	1.60	1.60	Nom.
Skelp, Grooved Iron, Pittsburgh	1.80	1.80	1.82½	2.10
Skelp, Sheared Iron, Pittsburgh	*1.85*	1.87½	1.90	2.15
Sheets, No. 27, Pittsburgh	*2.55*	2.55	2.60	2.85
Barb Wire, f.o.b. Pittsburgh	2.00	2.00	2.00	2.90
Wire Nails, f.o.b. Pittsburgh	2.00	2.00	2.00	2.05
Cut Nails, f.o.b. Pittsburgh	2.15	2.15	2.15	2.05
METALS:				
Copper, New York	**13.62½**	13.75	13.00	11.80
Spelter, St. Louis	**5.70**	5.60	5.45	5.15
Lead, New York	4.12½	4.12½	4.12½	4.10
Lead, St. Louis	**4.25**	4.20	4.05	3.97½
Tin, New York	*26.60*	27.50	28.25	27.00
Antimony, Haliett, New York	*6.00*	6.37½	6.50	8.00
Nickel, New York	40.00	40.00	40.00	40.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York	3.99	3.99	3.99	4.19

Chicago.

FISHER BUILDING, September 9, 1903.—(*By Telegraph.*)

The past week has contributed nothing to encourage the belief in a much larger volume of business in the very near future. This seems to be especially true of Steel, as with scarcely an exception the mills are able to make prompt deliveries, and there is nothing to encourage buying beyond immediate requirements, as the prospect is that while prices may be no lower they certainly will be no higher, and consumers are of the opinion that they may gain some advantage by delayed purchases. One of the principal features of the week has been the placing of large contracts by consumers for Soft Center Plow Steel for long delivery, some of these contracts extending over a period of five years at a material concession in prices, keen competition of independent with combination mills being responsible for this condition. With the exception of Merchant Pipe and Boiler Tubes all Finished Steel products have been quiet. There is much buying of Bars still to be accomplished, but the low price of Iron tends to throw consumption more largely on that product rather than Steel, which is held at previous prices. Black Sheets have been especially dull, heavy and irregular. The ability of Rail mills to make relatively prompt shipments on both standard and light sections has caused a severe drop in the price of Relaying Rails, which have at last settled down to normal conditions, at from $2 to $3 per ton under the price of new material. The Pig Iron market has developed a little better tone as far as prompt shipments are concerned, the demand being almost entirely for September and October deliveries and in moderate amounts. Large buyers are still holding off, but the agricultural implement interest is still picking up several 1000-ton lots of Foundry and Bessemer grades at current prices.

Pig Iron.—The continued active and even urgent demand for small quantities of Pig Iron for September and October deliveries has resulted in a little firmer feeling among producers, and for quick shipment it has been difficult for consumers to shade the $12 basis for No. 2 Foundry, Birmingham, although early in the week one or two insignificant transactions were made on the basis of $11.75. However, for the last half of the year most of the transactions have been made on the basis of $11.75 for No. 2 Foundry, Birmingham. In other respects the market has changed but little from the conditions reported a week ago, and very few large buyers have been in the market outside of the International Harvester Company and plow manufacturers, who have continued to pick up moderate amounts. One sale of 3000 tons of No. 2 Foundry and 2000 tons do. were made at $11.75 for deliveries beginning in October, extending through the last quarter of the year. One feature worthy of note is the amount of "off" Iron which has been offered and sold at relatively low prices. Furnaces both North and South which have been running cold have made off grades, and these have been accumulating for some time, and with the urgent demand for quick shipment this material has been readily disposed of, but, as above indicated, at concessions from current prices. The large majority of transactions reported this week are for No. 3 and lower grades, both Northern and Southern Iron, the former being sold on the basis of $16 for No. 2—that is, $15.50 for No. 3—with even this price shaded for lots sold by analysis. Outside of the sales to agricultural implement manufacturers the largest transaction of the week has been for 2000 tons of No. 2 at $11.75, Birmingham, for delivery through the last half of the year. There has continued to be a fair inquiry for Malleable and Standard Bessemer at about $17, Chicago, for Malleable and $17.50 for Standard, with one sale of 1000 tons of the latter reported sold on this basis, but some dealers claim to obtain 50c. more. There has also been a fair demand for Basic Iron, with sales of 500 tons of Virginia Basic on the basis of $13, Virginia furnace, equivalent to $12, Birmingham. There have also been sales of "off" Basic at considerable concessions. The urgency for spot or quick shipment Iron is reflected in the fact that dealers are purchasing from one another, there being a scarcity of such Iron, and the prospect not favorable for an improvement, and not a few furnaces are considering the advisability of banking or blowing out, as present market prices leave but a narrow margin of profit based upon the cost of production. The report that some large Southern companies have been taking business on the basis of $11, Birmingham, for No. 2 Foundry cannot be verified in this market and is not credited. In fact, the tendency is in the other direction. It may be noted that while the general market for Northern Iron is lower, local furnaces which are well sold are still holding out for $17. No positive information has been received here as to the reduction in freight rates from the South to Northern points, but furnace agents believe the demands of the furnaces have been granted. Just what the reduction, however, if any, will be and the date when effective is merely surmise. The following are the approximate prices current, f.o.b. cars, Chicago, the outside being for quick shipment and the inside for delivery during the last half of the year:

Lake Superior Charcoal	$19.00 to $20.00
Northern Coke Foundry, No. 1	16.50 to 17.00
Northern Coke Foundry, No. 2	16.00 to 16.50
Northern Coke Foundry, No. 3	15.50 to 16.00
Local Scotch, No. 1	17.50 to 18.00
Ohio Strong Softeners, No. 1	18.00 to 18.50
Ohio Strong Softeners, No. 2	17.50 to 18.00
Southern Silvery, according to Silicon	18.10 to 19.00
Southern Coke, No. 1	16.35 to 16.85
Southern Coke, No. 2	16.10 to 16.35
Southern Coke, No. 3	15.35 to 15.85
Southern Coke, No. 1 Soft	16.35 to 16.85
Southern Coke, No. 2 Soft	15.85 to 16.35
Foundry Forge	14.85 to 15.35
Southern Gray Forge	14.35 to 14.85
Southern Mottled	13.85 to 14.35
Southern Charcoal Softeners, according to Silicon	19.30 to 21.30
Alabama and Georgia Car Wheel	25.35 to 27.35
Malleable Bessemer	17.00 to 17.50
Standard Bessemer	17.50 to 18.00
Jackson County and Kentucky Silvery, 6 to 10 per cent. Silicon	20.30 to 22.30

Bars.—But little change has been noted in the market for Bars, either Iron or Steel, during the week. Very little new tonnage has been booked. The low prices for Iron continue to invite purchases at the expense of Steel wherever it is possible to substitute, but even so sales are moderate in amount, there being few, if any, lots of 500 to 1000 tons, most of the sales being in single car lots up to 200 tons, nearly all of which have been on the basis of 1.55c., Chicago, and some sales at Milwaukee at 1.57½c., delivered, freight being 50c. Some little improvement in specifications for Soft Steel Bars has been noted, but new business has been confined to small quantities, and prices have remained unchanged as previously quoted, the following being the quotations, f.o.b. cars, Chicago, mill shipment: Bar Iron, 1.55c. to 1.60c.; Soft Steel Bars, 1.76½c. to 1.86½c.; Hoops, 2.06½c. to 2.16½c.; Bessemer Bands, 1.76½c. to 1.86½c.; Angles, under 3 inches, 1.86½c. to 1.91½c., base. The Merchant trade has been moderate and mainly for Iron Bars, the market remaining steady at 1.90c. in carload lots, and 2c. to 2.10c. in less than carload lots. Soft Steel Bars sel at 2c. rates; Angles, under 3 inches, 2.10c. rates and Hoops, 2.40c., base, from store.

Structural Material.—The market has been unusually quiet, and with the exception of the contract for railway material at Milwaukee and the Pennsylvania Depot at Washington, bids for which close to-day, no large business is in immediate sight, but there has been a fair aggregate of small tonnage. The mills are able to make almost immediate shipment on nearly all sizes, and consumers see little incentive to make purchases under present conditions, especially as prices remain unchanged, and are as follows for mill shipment, Chicago: Beams, Channels and Zees, 15 inches and under, 1.75c. to 1.90c.; 18 inches and over, 1.85c. to 2c.; Angles, 1.75c. to 1.90c. rates; Tees, 1.80c. to 1.90c.; Universal Plates, 2c. to 2.25c. Local stocks are large, and there is little movement, but prices are sustained as follows: Beams and Channels, 2.10c. to 2.25c.; Angles, 2.10c. to 2.25c.; Tees, 2.15c. to 2.30c., from local yards.

Plates.—New business during the week has been confined to a few hundred ton lots, but more specifications have been received on contracts. The general conditions are unchanged, and prices sustained at the following list, f.o.b. cars, Chicago, mill shipment: Tank Steel, ¼ inch and heavier, 1.75c. to 2c.; Flange, 1.85c. to 2.15c.; Marine, 1.95c. to 2.10c. The demand for shipment from local stocks is moderate and readily met at previous prices, which are as follows: Steel, ¼ inch and heavier, 2c. to 2.15c.; Tank Steel, 3-16 inch, 2.10c. to 2.25c.; No. 8, 2.15c. to 2.30c.; No. 10, 2.30c. to 2.40c.; Flange Steel, 2.25c. to 2.40c., all f.o.b. warehouse, Chicago.

Sheets.—For Black Sheets the market has continued heavy and irregular. There is much keen competition, and it is difficult to give exact trading prices, but approximately they are as follows, f.o.b. cars, Chicago, for mill shipment: No. 10, 1.96½c. to 2.06½c.; No. 12, 2.06½c. to 2.16½c.; No. 14, 2.16½c. to 2.26½c.; No. 16, 2.26½c. to 2.36½c.; Nos. 18 and 20, 2.41½c. to 2.51½c.; Nos. 22 and 24, 2.51½c. to 2.61½c.; No. 26, 2.61½c. to 2.71½c.; No. 27, 2.71½c. to 2.81½c.; No. 28, 2.81½c. to 2.91½c. Small lots for shipment from local warehouses bring from 10c. to 15c. over mill prices. Galvanized Sheets have been moderately active, and much better sustained than Black, there being few mills quoting better than 75, 10 and 2½ discount, mill shipment, while small lots from local stores are held at from 75 and 2½ to 75 and 5 discount.

Cast Iron Pipe.—A moderate demand has been experienced for small quantities for extensions by gas and water companies, but the city of Seattle has placed a contract for 600 tons of 6's, 8's, 10's and 12's, and a contract for 4000 tons of 24's to 36's will probably be placed at Colorado Springs, Col., to-day. The market has remained steady for small orders, which are filled at the following prices, f.o.b. cars, Chicago: 4-inch, $31; 6 and 8 inch, $30; larger sizes, $29, in carload lots, for Water, and $1 per ton higher for Gas Pipe.

Billets.—The market is extremely dull, there being little demand even for Forging Billets, and prices are nominally unchanged. Bessemer Billets are held at $28 and Open Hearth at $29, f.o.b. cars, Chicago. Open Hearth Forging Billets are held at $32 in carload lots, with $1 to $2 per ton asked and obtained for less than carload lots, according to analysis, buyer and time of delivery.

Merchant Pipe.—The situation is unchanged, the demand continuing active for nearly all sizes, contracts placed during the week showing considerable increase over the preceding week. The demand continues active, and the market firm in tone at the following schedule of discounts in carload lots, Chicago, base, random lengths, mill shipment:

	Steel Pipe.		Guaranteed Wrought Iron	
	Black.	Galvd.	Black.	Galvd.
	Per cent.	Per cent.	Per cent.	Per cent.
⅛ to ⅜ inch	66.35	56.35	63.35	53.35
½ inch	68.35	58.35	65.35	55.35
¾ to 6 inches	73.35	63.35	70.35	60.35
7 to 12 inches	67.35	57.35	64.35	54.35

Less than carloads, 12½ per cent. advance.

Boiler Tubes.—The mills are well supplied with orders and new business is satisfactory, the market remaining firm at the following schedule of discounts, mill shipment, f.o.b. cars, Chicago:

	Steel.	Iron.
1 to 1½ inches	40	35
1¾ to 2½ inches	55.85	35.85
2¾ to 5 inches	60.85	45.85
6 inches and larger	55.85	35.85

Less than carloads, 12½ per cent. advance.

There has been an improved demand for distribution from local stocks, and the market has been steady at the following schedule of discounts for shipment from local warehouses:

	Steel.	Iron.
1 to 1½ inches	40	35
1¾ to 2½ inches	50	32½
2¾ to 5 inches	57½	42½
6 inches and larger	50	

Merchant Steel.—There has been a fair demand for agricultural specialties, several manufacturers having placed additional orders for the season's requirements during the last week, but the feature of special interest has been the taking of a number of contracts for Soft Center Plow Steel at very low prices. It is reported that five-year contracts have been placed on the basis of 4½c., and to induce purchases consumers whose contracts have still a year to run have been given the advantage for the unexpired term and booked for the full five years. This situation is reported to have resulted from keen competition of independent companies, who have heretofore been getting quite a foothold in the market in competition with syndicate Steel. There has also been a fair demand for Crucible Tool Steel, and it is reported that prices have been shaded on long time contracts. The following are the official prices current, f.o.b. cars, Chicago, mill shipment: Smooth Finished Machinery Steel, 2.01½c. to 2.11½c.; Smooth Finished Tire, 1.96½c. to 2.11½c.; Open Hearth Spring Steel, 2.66½c. to 2.76½c.; Toe Calk, 2.31½c. to 2.46½c.; Sleigh Shoe, 1.86½c. to 1.96½c.; Cutter Shoe, 2.41½c. to 2.61½c. Ordinary grades of Crucible Tool Steel are quoted at 6c. to 8c. for mill shipment; Specials, 12c. upward. Cold Rolled Shafting in carload lots sells at 47 and in less than carload lots at 42 discount from list.

Rails and Track Supplies.—There has been a better inquiry for 1904 delivery, but few contracts have been closed, and there has also been a fair demand for both Standard and Light Sections for delivery during this fall, sales aggregating from 2000 to 3000 tons for the week. The market remains steady in tone, sales of Standard Rails being made at $28 and second quality $27, mill shipment. Light Rails are selling at $34 to $35. Track Supplies have been steady and moderately active, without change in prices, which are as follows: Splice or Angle Bars, 2c. to 2.10c.; Spikes, 2.10c. to 2.15c.; Track Bolts, 3½ to 3¾ inches and larger, with Square Nuts, 2.85c. to 2.90c.; with Hexagon Nuts, 3c. to 3.10c. From store 10c. to 15c. over mill prices are asked and obtained.

Old Material.—The tendency of prices for Heavy Steel and Wrought Iron is still downward, the largest Open Hearth furnace buyers in this section being well supplied for from 30 to 60 days, and even the purchases of rolling mills are light and mainly from hand to mouth, while offerings from railroads continue quite liberal. Holders in the country, however, seem indisposed to sell at market prices, but this makes little difference in the general situation. There has been an especially heavy drop in the price of Relaying Rails, because new material can be obtained promptly, and in some instances at lower prices. This refers especially to medium weight Rails, 30 lbs. and heavier.

Metals.—Copper has continued firm and prices in this market have advanced slightly, but with little increase in demand. Casting Copper is held at 13¼c. to 13⅜c., and Lake at 13½c. to 13⅝c., in carload lots. Spelter has continued strong and active, with prices again higher, sales being made on the basis of 5.70c. to 5.75c. for September and 5.65c. to 5.70c. for October delivery. There is very little available on spot. Lead has continued firm, with a good demand and little available, some smelters being sold ahead from 30 to 60 days. Prices are nominally unchanged at 4.05c. in 50-ton lots and 4.07½c. in carload lots. Old Metals have been moderately active and firm in tone, but without essential change in prices. Heavy Cut Copper is selling at 12⅛c., Red Brass at 11⅛c., Copper Bottoms at 10¾c., Lead Pipe at 3.80c. and Zinc at 4.65c., spot.

Coke.—But little change has been noted in the market during the week, supplies being ample and the demand not especially active, but prices have been well sustained. The principal feature in the market seems to be the continued difficulty in obtaining prompt shipments from the ovens, due to lack of transportation facilities rather than to scarcity of material. Connellsville, Pocahontas and New River 72-hour Foundry Coke is selling at $2.75 to $3.25, and Furnace Coke at $1.75 to $2.25, at the ovens; freight, Chicago, $2.65. Among the sales were 300 cars at $1.95, at the ovens, for delivery during the last half of the year. A large tonnage is reported to have been sold for export, shipments to be made from the Pocahontas field.

Philadelphia.

FORREST BUILDING, September 8, 1903.

Conditions in the Iron and Steel trades have not improved during the past week. It is true that Labor Day caused some little disarrangement, but apart from that it is evident that there is a disposition to wait developments before making further engagements. Making the best of the situation, it must be conceded that the tendency is not in the direction of improvement, and while a change may occur in the near future, indications of such an event are not encouraging. This is shown by a gradual weakening in prices. There is hardly an exception to this general statement, although it is the most distinctly shown in Pig Iron. Prices of this article are undoubtedly weak. There is no uniformity whatever, each transaction being graded according to the circumstances in each individual case. Buyers that can be depended upon to take large lots at fixed dates have special advantages, and can get unusually low quotations. Buyers of 50-ton lots up to 100 or 200 or 300 tons each, can do a little better than last week, but all depends on circumstances. A few special brands still command $17 and upward for No. 2 X Foundry, while 500 to 1000 ton lots can be done at pretty nearly $1 less. Mill Irons are specially weak, $15 to $15.50 being a fair average for good brands and less than $15 for ordinary grades. Exceptional sales have been made at figures considerably less than the lowest that are above mentioned, but average transactions would be from $16 as the lowest to $17.50, delivered, for No. 2 X Foundry, price graded according to quantity brand, point of delivery, &c. In the more advanced products, conditions are not much better than in the raw material. Prices are weak, the demand slow, and mills are all more or less short of orders. It is hoped that the safe maturity of the crops will give a fresh start to business, and in all probability the volume will be larger, although better prices are not looked for in the immediate future.

Pig Iron.—A considerable tonnage of Iron has been sold during the past week, a feature which is not as stimulating as it would be if prices had been a little better. It is difficult to determine what really representative figures would be. Some Iron has been sold at as low as $16 for No. 2 X, delivered, while in other cases over $17 has been paid, so that one may claim $16 as a price, while with equal justice another may say that $17.25 or $17.50 is the price. The question turns on what direction the market will take. Will the $16 sales or the high priced sales be the regular market prices two or three weeks hence? On this point one man's guess may be as good as any other man's guess, but it is generally agreed that the outside figure is due to exceptional conditions. A special brand or a small lot cannot be regarded as representative, and as the heaviest sales are at the lowest figures, indications appear to be that the present difference will be considerably modified, and especially so in view of the fact that there is a good deal of pressure to secure business for deliveries during the remainder of the year and during the first quarter of 1904. There might be a better chance for recovery if the demand for finished products was better, but all departments show more or less shrinkage, and with the present large output it is probable that there will be something more than a full supply. The range of prices, covering both extremes, would be about as follows for lots delivered in buyers' yards, Philadelphia or nearby points:

No. 1 X Foundry	$17.50 to $18.00
No. 2 X Foundry	16.25 to 17.25
No. 2 Plain Foundry	15.50 to 16.00
Standard Gray Forge	15.25 to 15.50
Ordinary	14.50 to 15.00
Basic	15.25 to 15.50
Low Phosphorus	21.50 to 22.00

Steel.—The demand is fair, but it is difficult to meet buyers' ideas in regard to prices, and even when sellers are disposed to make concessions buyers fail to make a satisfactory response. Under such conditions sales are small but frequent, at prices varying from $28 to $28.50, delivered. Foreign Steel could be done at $27, ex-ship, duty paid, but buyers prefer deliveries as required and are therefore not bidding for foreign Steel at figures likely to be accepted.

Plates.—Businss is in fairly good condition as regards small and medium sized orders, but there are no large contracts in view at the present time. Some of the mills have been shut down for repairs, during which time orders accumulated somewhat, so that for the present full time will probably be made, although there is no great pressure for deliveries. Quotations are as follows for city and nearby deliveries, base prices up to 100 inches: Tank Steel, both Sheared and Universal, 1.75c. to 1.80c., in large lots; Flange, 1.85c. to 1.90c.; Commercial Fire Box, 1.95c. to 2c.; Locomotive Fire Box, 2.25c. to 2.30c.; small lots, 10c. to 15c. per 100 extra; 100 to 110 inches, 0.05c. extra; 110 to 115 inches, 0.10c. extra; 115 to 120 inches, 0.15c. extra; 120 to 125 inches, 0.25c. extra; 125 to 130 inches, 0.50c. extra; over 130 inches wide, 1c. extra; Plates under ¼ inch on edge, 0.10c. extra; under 3-16 inch on edge to No. 8, 0.15c. extra; No. 9, B. W. G., 0.25c. extra; all Sketch Plates, 0.1c. extra; all Circle Plates, 0.2c. extra.

Structural Material.—Business in this department is undoubtedly dull, and prospects for its substantial recovery are not good. The building trade has been seriously impaired by the numerous strikes, and a great deal of work has been indefinitely postponed, until it is felt that conditions are more settled. The consequence is that the mills need more work to keep them actively employed, while the chances for securing it are not encouraging at the present time. Prices are unchanged, however, at 1.73½c. to 1.85c. for Beams, Channels or Angles, according to specifications.

Bars.—There is more demand for Bar Iron at the prices now ruling, the cost being lower than Steel Bars, making it a special inducement in many cases. There is considerable irregularity; but, as a rule, 1.60c. is as well as can be done for carload lots of good refined Iron. Some mills that make an extra good article would not accept business

at the price named, while others less favorably known, quote as low as 1.50c. to 1.55c., delivered. Steel Bars dull and unchanged at 1.73½c. to 1.80c., according to specifications.

Sheets.—The market cannot be called active, although there is a fair average business, considering the dullness in most other lines. Prices are unchanged, although first-class business can be placed at pretty low figures if quantity and delivery present attractive features.

Old Material.—The market is extremely uncertain, although prices, as a rule, are lower than they have been at any time during the year. There appears to be more demand, however, and it is not unlikely that the market is on the verge of improvement. Bids and offers about as follows for deliveries in buyers' yards:

Old Steel Rails	$16.00 to $17.00
Heavy Steel Scrap	16.00 to 16.50
Low Phosphorus Scrap	24.00 to 25.00
Old Steel Axles	18.00 to 19.00
Old Iron Rails	19.00 to 20.00
Old Iron Axles	20.00 to 21.00
Old Car Wheels	19.00 to 20.00
Choice Scrap, R. R. No. 1 Wrought	17.00 to 17.50
Country Scrap	15.00 to 16.00
Machinery Scrap	15.00 to 16.00
No. 2 Light Scrap	16.00 to 17.00
No. 2 Light (Ordinary)	11.00 to 12.00
Wrought Turnings	11.50 to 12.00
Wrought Turnings, Choice Heavy	13.00 to 14.00
Cast Borings	7.75 to 8.25
Stove Plate	11.75 to 12.25

Birmingham.

BIRMINGHAM, ALA., September 7, 1903.

There has been some diminution in the demand for Iron, and the orders are only of moderate volume. There seems to have been a feeling that at the meeting of the Iron Committee during the past week (which represents the railroads) the rate of freight petitioned for would be granted. This may have had more or less influence in delaying the placing of new business. Anyway, the anticipated increase that was to follow the concession offered by lowered prices has not materialized, and it begins to look as if it would require another cut to coax activity in the market. It can be safely said, yet, that no Iron is being bought but what is necessary to supply pressing requirements. The preceding week the volume of business was greater, and the indications pointed to a continuance. But there was an undoubted inclination to await the action of the Iron Committee as to a reduction in the freight rate before placing important business. The committee met, considered and discussed the question, but the rate was not lowered. It was a great disappointment, as favorable action would have resulted in the movement with promptitude of our surplus stock in the furnace yards. But this is not the only trouble that besets the furnacemen. Every mail brings letters of excuse for declining to receive purchases made at higher prices. In not infrequent instances they are tantamount to a repudiation of contract. It is singular that there are so many firms in this category who are quoted by commercial directories as of good credit. In strong contrast is a contingent in the trade that is promptly taking purchases and paying for them as delivered. If there is any discontent harbored by them it is not displayed by any baby act on their part. If the market advances, after a sale, the seller is held to delivery in all cases; and "its a poor rule that won't work both ways." The evil will work its own cure by a culling of the list of those who buy for forward delivery. It is getting to be a serious question. It is almost "a crying evil."

The buying the past week was, as above indicated, in small and moderate amounts and for prompt and nearby delivery. Quotations were fairly well maintained on the basis of $11.50 for No. 3 Foundry. In some cases there was a concession of 25c., as circumstances prompted. If any sales were made on lower basis the secret has been well kept. As stated in previous letter, prices are now at such a point that a further concession in prices would nip profits in the bud, except with furnaces favorably situated as to ownership of raw material, and some are now figuring as to the point prices can go, and then continue in blast without loss. The danger line with some is but a short space ahead. So far there has been no trouble as to cars; but appearances indicate that it will be much in evidence later on, and be an important factor in the trade.

Chicago parties have opened some new coal mines in the Gadsden district, which they will develop on a large scale. Other large interests in this district are active in developing valuable coal properties, and our output for the year will be measured by the labor available.

For some time the demand has exceeded the home supply and other districts have been invaded with more or less success to obtain it. Attention has been directed to the Pennsylvania field, and one need not be surprised if recruits to the ranks of labor here are drawn from that field. It is simply a question of cost. One thing is certain. We cannot increase our output without adding to our labor. With the increase of labor our present output would soon be doubled without drawing more than a small interest on the output available to the miners' pick.

Pittsburgh.

PARK BUILDING, September 9, 1903.—(*By Telegraph.*)

Pig Iron.—The Pig Iron market continues exceedingly quiet, consumers still confining their purchases to small lots for immediate needs. It is not believed there will be any considerable buying for some little time, as consumers are pretty well covered, and in addition some of the Steel mills and finishing mills are either idle or else are running only part time. Four or five blast furnaces in the Pittsburgh district and six or eight in the two Valleys are idle for repairs, and this will decrease considerably the output of Pig Iron this month. The United States Steel Corporation have not as yet come in the market for any Iron for fourth quarter shipment. Small lots of Bessemer Iron for prompt shipment are being offered at $16.50, at Valley furnace, equal to $17.35, Pittsburgh. Very little Iron, however, is available at this price. Northern Gray Forge is still held at $15.50, Pittsburgh, and No. 2 Foundry Iron at $16.25 to $16.50, Pittsburgh. Very little, if any, Southern Iron is coming into this market.

Steel.—There is practically no buying of Steel, and five of the leading plants in the Pittsburgh district are shut down. There are persistent reports that Steel is being sold below pool prices, but if these are true it is probably being done by Open Hearth mills outside the agreement. We quote Bessemer Billets at $27, Open Hearth at $28, Pittsburgh, Youngstown or Wheeling delivery. Sheet Bars, cut to multiple lengths, take $1 advance over Billets and short pieces $1.50 advance.

(*By Mail.*)

A meeting of the Steel Bar mills was held in the Union Club, Pittsburgh, to-day (Tuesday), at which it was agreed to reaffirm the present price of 1.60c., Pittsburgh, for carloads and larger lots. The Southern railroads held a meeting on Saturday, September 5, at which the request of the Southern furnace operators for a reduction of 50c. a ton in freight rates on Pig Iron was refused. Aside from the above, nothing of special interest has come up in the Iron trade since our last report. The general situation is quiet, but a fair amount of tonnage in Finished Iron and Steel is being placed, particularly in Wire products and Pipe, the demand for which is quite heavy. The present quiet condition is likely to continue for several weeks yet, but along about September 20 or 25 a material increase in demand for Iron and Steel products is expected. The money market seems to be easier and, with the favorable crop reports that are coming in, it is the opinion that we will have a good fall and winter business in the Iron trade. A number of the leading Steel plants are closed to make repairs and for lack of orders, and this will cause a heavy decrease in the output of Steel, the demand for which at the present time is very quiet. On September 1 there were four blast furnaces in the Pittsburgh district idle, there being one Carrie, one Edgar Thomson, one Duquesne and one Isabella, all of the Carnegie Steel Company. These furnaces being idle will cut down the output of Pig Iron in September considerably.

Iron and Steel Bars.—The leading Steel Bar mills held a meeting in the Union Club to-day which was well attended, all of the leading mills being represented in person. After a careful canvass of the situation it was decided to reaffirm the present price of Steel Bars on the basis of 1.60c., Pittsburgh. It is the unanimous opinion that to make any reduction in the price of Steel Bars at this time would only work injury to the market instead of bettering it. It was pointed out that the cost of making Steel Bars is higher now than it was when the price was advanced to 1.60c. Wages, freights and the cost of raw material are all higher. A moderate tonnage is coming in and the mills are fairly busy, but could turn out more work if they had it. There is still a good deal of cutting in the price of Iron Bars, as low as 1.45c., at Eastern mill, having been done. The price of Iron Bars is about 1.60c., Pittsburgh, but for delivery at other points lower prices are made. We quote Steel Bars at 1.60c., Pittsburgh, in carloads and larger lots. For quantities less than 2000 lbs., but not less than 1000 lbs., $2 a ton additional is charged, and less than 1000 lbs., $6 additional.

Sheets.—Several of the leading Sheet mills advise us that tonnage in Sheets is improving, and the outlook for a good fall business is fairly satisfactory. We quote No. 27 Black Sheets, box annealed, one pass through cold rolls, at 2.55c. to 2.60c., and No. 28 at 2.65c. to 2.70c., in carloads and larger lots. On a nice specification and for a large contract the lower prices might be slightly shaded by a few mills. Galvanized Sheets are held at 75, 10 and 5 off, at mill, for carloads and larger lots. Jobbers charge the usual advance for small lots from store.

Steel Rails.—An inquiry is in the market from an extreme Western road for about 25,000 tons. Only small lots are being bought, and the roads are slower this year than usual in placing their contracts. We quote at $28, at mill, for Standard Sections. Light Rails are weaker in price, and are quoted at $30 to $32, depending on weight.

Hoops and Bands.—A good deal of tonnage is being placed in Hoops and Bands, but the Cotton Tie season has not yet opened. The demand for the latter product is expected to be heavier this year than last. We quote: Cotton Ties, 87c. in 10,000-bundle lots or over; 92c. for carloads; Steel Hoops, 1.90c. in 250-ton lots and 2c. for carloads; Bessemer Bands, 1.60c. to 1.70c. for Open Hearth. Extras as per Steel card.

Muck Bar.—The market continues very dull, and standard makes of domestic Muck Bar are being offered at $29, Pittsburgh, with a probability that on a firm offer a lower price would be made. There are frequent offerings of Eastern Muck Bar in this market, but no sales have been made for some time.

Ferromanganese.—Some Manganese from Australia has recently been sold in this district at $49, delivered. It is said to be fully equal in quality to domestic or English. We quote English and domestic Ferro at $49, delivered, for 50-ton lots and over.

Spelter.—The market continues firm, and the demand is active. We quote Prime Western grades at 5.68½c. for future delivery and 5.73½c. for spot delivery, f.o.b. Pittsburgh.

Plates.—Tonnage in Plates is a little better, and during the past week some fair sized lots have been placed, one of 300 tons and another of 500 tons. The demand from the Steel car interests is light, and no important tonnage from these concerns has been booked for some time. Some mills are fairly well filled up, having from a month's to six weeks' work ahead, while others are about at the end of their contracts. Once the trade get disabused of the idea that there will be a reduction in the price of Plates, it is expected they will be ready to contract, which does not seem to be the case just now. Prices are firmly held, and are as follows: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price up to 3c. Plates more than 100 inches wide, 5c. extra per 100 lbs. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra; No. 9, $5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms net cash in 30 days.

Rods.—There is a fairly active demand for Rods, Bessemer being held at about $35 and Open Hearth at $36. On a firm offer these prices might be slightly shaded. Chain Rods of special stock are held at $37, Pittsburgh.

Structural Material.—As a rule, Structural shops report new work very dull, only small jobs being placed and not many of these. The strikes in the building trades have done a fearful amount of harm to the Structural trade, and many of the large jobs that have been postponed may never come up again. The leading interest is figuring on a good deal of bridge work, some of which is likely to be placed before very long. The tonnage booked in August was fairly satisfactory, and for September is expected to show an increase if some of the large contracts now under negotiation are closed. We quote: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.60c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c.

Tin Plate.—Matters in the Tin Plate trade have quieted down to some extent, and no large contracts are being placed at this time. The mills are reasonably well filled up for the next month or six weeks. Most of the orders being placed are at the regular price of $3.80, Pittsburgh, for 100-lb. Coke Plates. Premiums for early delivery have about disappeared.

Merchant Steel.—The demand for Agricultural Steels has picked up considerably in the past two or three weeks, and the mills are entering more tonnage than for some time. The demand for Shafting is somewhat quiet, and Tool Steel is in fair request. The agricultural implement makers are placing some small contracts, but the large tonnage from this class of buyers has not been given out. Prices are fairly firm and we quote: Open Hearth Spring, 2.30c. to 2.40c., base; Toe Calk, 2.25c., base, half extras; Tire Steel, 1.80c. to 2c. for usual sizes; Plow Slabs, Bessemer, 2.25c.; Open Hearth, 2.50c.; Tool Steel, 6½c., base, and upward; Shafting, 42 per cent. off in less than carloads and 47 per cent. in carloads, delivered in base territory.

Skelp.—There is very little doing in Skelp and the tone of the market is weak. We quote Grooved Iron Skelp at 1.80c. and Sheared at 1.85c. to 1.87½c., f.o.b. Pittsburgh. On a good sized contract of desirable sizes it is possible these prices would be slightly shaded.

Pipes and Tubes.—The demand for the smaller sizes of Merchant Pipe has fallen off to some extent, but on the larger sizes continues heavy, and the mills are filled up for several months ahead. Inquiries are in the market for a good sized tonnage of Line Pipe 10 inches and larger, but the mills are so congested with orders that it is doubtful if this tonnage can be gotten out this year. Prices are well maintained, discounts to consumers in carloads being as follows:

	Steel.		Wrought Iron.	
	Black.	Galv.	Black.	Galv.
	Per cent.	Per cent.	Per cent.	Per cent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inches	75	65	72	62
7 to 12 inches	69	59	66	56

Merchant Boiler Tubes.

	Steel.	Iron.
1 to 1¼ inches	42½	39
1¾ to 2½ inches	55½	38
2¾ to 5 inches	61	48
6 to 13 inches	55½	38

The outside mills rolling Iron Pipe are naming lower discounts than are given above.

Iron and Steel Scrap.—There is so little doing in Scrap that prices are merely nominal and depend altogether on conditions surrounding transactions. Dealers who have Scrap loaded for cars and are compelled to move it must accept almost any price that consumers will pay. On the other hand, dealers who have Scrap piled in their yards ask fair prices for it, but very few consumers will take in material at the present time. We quote Heavy Melting Stock at $17.50 to $18, in gross tons, but these prices have been shaded in cases where parties were compelled to move material. No. 1 Wrought Scrap is $14.50 to $15, in net tons; Car Wheels, $20, gross tons; Cast Scrap, $16, gross tons; Wrought Iron Turnings, $11.50 to $12, net tons; No. 1 Busheling Scrap, $14, net tons, and No. 2, $12, net tons; Steel Rails for rerolling are about $18, gross tons; Iron Axles, $25.50 to $26, gross tons, and Steel Axles, $22.50 to $23, gross tons. As stated above, prices on Scrap are nominal, so few sales being made that it is difficult to quote the market.

Coke.—Conditions in the Coke trade remain about the same as noted in these columns for several weeks past. There seems to be some improvement in the demand, and the large Coke plants in the Connellsville region made a better run last week than for some time. The opening of a new Coke and Coal railroad, which will pass the Lower Connellsville region, will greatly facilitate shipments. A good many new blast furnaces are under erection, which will be completed about the first of the year, and this will cause a heavier demand for furnace Coke. There has been some talk of a readjustment of wages of Coke workers to conform to the lower prices that are ruling, but nothing definite has been done in this direction as yet. Strictly Connellsville furnace Coke is held at about $2.50 a ton at oven, but in exceptional cases this price is shaded. Main line furnace Coke is selling at $2 to $2.25 a ton, at oven; 72-hour Connellsville Foundry Coke is about $3 a ton, at oven, and several fair sized lots have been sold in the past week at this price. Main line Foundry Coke is selling at about $2.50 a ton, at oven. The output of Coke last week in the Upper and Lower Connellsville regions was about 300,000 tons, a material increase over the previous week.

St. Louis.

CHEMICAL BUILDING, September 9, 1903.—(*By Telegraph.*)

Pig Iron.—Buying the past week has been confined for the most part to small lots of 100 to 200 tons, covering actual wants for the next 60 days or thereabouts. Some contracts carry to January 1, but such orders are the exception. Some sales have been made on a Birmingham basis for No. 2 Foundry of $11.50, but we believe for the most part the associated furnace price of $12 is being maintained. We quote, f.o.b. St. Louis, as follows:

Southern, No. 1 Foundry	$16.25 to $16.50
Southern, No. 2 Foundry	15.75 to 16.00
Southern, No. 3 Foundry	15.25 to 15.50
Southern, No. 4 Foundry	14.75 to 15.00
No. 1 Soft	16.25 to 16.50
No. 2 Soft	15.25 to 15.50
Gray Forge	14.75 to 15.00
Southern Car Wheel	26.75 to 27.00
Malleable Bessemer	19.25 to 19.75
Ohio Silvery, 8 per cent. Silicon	23.00 to 23.50
Ohio Strong Softeners, No. 1	19.25 to 19.75
Ohio Strong Softeners, No. 2	18.75 to 19.25

Bars.—There continues a good demand for Iron and Steel Bars, and jobbers maintain former prices. In lots from store the quotations are 2.15c. to 2.25c. for both Iron and Steel.

Rails and Track Supplies.—Considerable activity continues, and the inquiry and demand are said to be satisfactory. We quote as follows: Splice Bars, 2.05c. to 2.15c.; Bolts, with Hexagon Nuts, 3.05c. to 3.15c.; with Square Nuts, 2.90c. to 3c.; Spikes, 2.15c. to 2.25c.

Angles and Channels.—In line with other supplies in the hands of the heavy jobbers, sales of small Angles and Channels are said to be quite active at 2.25c. to 2.40c., from store.

Pig Lead.—Offerings are reported to be in small volume, hardly equal to the demand for spot delivery; 4.25c. is bid for Missouri brands for quick delivery, with 4.20c. for future supplies.

Spelter.—Continued firmness prevails, with limited offerings for immediate delivery at 5.70c. Future delivery nominally 5.60c.

Cleveland.

CLEVELAND, OHIO, September 8, 1903.

Iron Ore.—The dullness continues, nothing whatever in the way of sales to the furnaces having been reported. All the evidences are that the movement of Ore down the lakes this year will be appreciably less than last year, the curtailment being understood to come in the movement from now forward. The prices prevailing, although nominal, hold at $4.50 for Bessemer Old Range and $4 for Bessemer Mesaba. The lake tonnage is abundant and, in fact, the employment of vessels in the eastbound trade falls almost entirely upon Ore, giving that trade more tonnage than is actually required. The movement is in consequence as heavy as the demands of the trade will permit. The result is that the lower lake docks are well filled with piled Ore, and the furnace stock piles are large. The shipments down the lakes during August amounted to 4,060,211 tons, against 4,078,311 tons last year, a decrease of 18,100 tons. The shipments to September 1 amounted to 16,385,854 tons, against 17,051,530 tons for the same period a year ago. This shows a decrease of 665,676 tons.

Pig Iron.—The demand is a little heavier, and the buying for spot delivery shows considerable activity as compared with the recent previous weeks. Practically, all of the furnaces in the Valley are in operation and the shipment from them is heavy. The Northern furnaces have been selling in 500-ton lots of late, with specifications for immediate shipment on a good part of it. Some sales, which otherwise would have been made, are being held up for the time being until the decision of the Southern roads on freight rates is known. The competition of the Birmingham stacks is therefore still seriously felt in this territory. While the rate question remains undecided the Northern furnaces are adhering to their prices of $16 for No. 2 Foundry in the Valleys. There is a sharp call for Malleable Iron. The price holds at $16.50 in the Valley. The call for Gray Forge is also considerable, but without change of price, which is still $16 in the Valley. There are persistent rumors of inquiries by the United States Steel Corporation for Bessemer Pig, but the Bessemer Association still announces that no transactions can be reported. The situation in the trade is about as it has been, a few very small lots being sold at $18 in the Valley, and a few inquiries coming in from independent consumers for small lots of material, but with no developments in the business for the fourth quarter of the year. The same situation applies with equal force to Basic. The reports of inquiries for fourth quarter material are free enough, but the actual business is very light. The price still holds nominally at $18 in the Valley. The supply of Coke in the Valley is all that could be desired, but there are still the menacing aspects of the freight car shortage, which it is feared will bring about another shortage of Coke this fall. Meanwhile, the shipment is untrameled, and the production is heavy.

Finished Iron and Steel.—The Bar trade continues to be the one feature of the market around which there is the greatest activity and interest. Reports have been frequent of cuts in the price of Bars, but it seems that the bottom has been reached. The last sales were made at 1.50c., at the mill. Bar Iron sales have continued to be heavy on the lower basis, the Iron being preferred. The call from the agricultural implement works for Steel Bars has caused a heavy selling in that material also. Prices have not changed, being for Bessemer Bar Steel 1.60c., Pittsburgh, and for Open Hearth Steel 1.70c., Pittsburgh; Bar Iron, 1.50c., at the mill, with, however, local conditions ruling and governing this price. In Sheets there is an increasing activity, and the sales have been heavier. Business seems to be picking up considerably. Smaller mills are finding it less difficult to get business, and have been holding nearer to association prices. The larger mills are not all in operation, but those which are have been able to keep running on orders obtained at or near the association prices. Nominally the prices on business done through jobbing houses hold as they have been at 3.05c. for No. 27 Black Sheets, out of stock; 2.20c. for No. 14 Blue Annealed, in car lots, at the mills; 2.75c. for No. 27 One Pass Cold Rolled, in car lots, at the mills, and 4c. for No. 27 Galvanized Sheets, out of stock. Plates have been steady but dull, the market offering but little new business and but few specifications against old contracts. However, the mills in operation are kept busy, although the business is not assured any distance in the future. The price holds at 1.60c., Pittsburgh. Structural is quiet. The labor difficulties have stopped building, which reacted upon the Steel trade. The jobbers are doing nothing and prices are almost nominal at 1.60c., in car lots, at mills, and 2.15c., out of stock. There is a good call for Rails, but the inquiry stage has not been passed.

Old Material.—The Scrap trade is still dull and listless, with, however, a few inquiries coming in which indicate a little business ahead. The prices are quoted, nominally, all gross tons: Heavy Melting Steel, $17.50; Old Steel Rails, $18.50; Old Iron Rails, $22; Old Car Wheels, $19; Railroad Malleable, $17; Cast Borings, $8.50. All net tons: No. 1 Railroad Wrought, $16.50; No. 1 Busheling Scrap, $14.50; Wrought Turnings, $12; Iron Car Axles, $22.50; No. 1 Cast Scrap, $14.50; Stove Plate, $11.50.

Cincinnati.

FIFTH AND MAIN STS., September 9, 1903.—(*By Telegraph.*)

Judging from the superficial conditions, the general condition of the Pig Iron market has not materially changed during the past week. The character of trade remains the same. Buyers are taking their wants for the day, and but very few of them are willing to talk contracts for a longer time than 60 days. But if these conditions could be kept up on a little more active basis there would probably be but very little kicking to be heard. Some buyers are inquiring and talking about contracting for considerable Iron, but in every case this has simply resulted in the sale of a tenth part of the Iron asked for and postponement of the main proposition. One sale of 2600 tons of a superior article of Gray Forge is reported at $10.75, Birmingham, basis. Other sales of Gray Forge of 500 tons each are noted as low as $10, same basis, so from this it appears that the market is, at least, a little irregular. Foundry Irons are selling on the same basis as last week, and no trades are reported at less than $10.50, Birmingham. Northern Foundry Irons are reported to have sold at a reduction of about 50c. under the quotations of last week. The meeting of the Southern Railroad Association was a disappointment to the shippers of Southern Iron, for it is understood the railroads refused to make any concession or reduction in the freights now current. The outlook is for a quiet market, with hand to mouth business as for the past few weeks. Freight rates from the Hanging Rock district, $1.15, and from Birmingham to Ohio River points, $3.25. We quote, f.o.b. Cincinnati, for delivery throughout the year, as follows:

Southern Coke, No. 1	$15.25 to $15.75
Southern Coke, No. 2	14.75 to 15.25
Southern Coke, No. 3	14.25 to 14.75
Southern Coke, No. 4	13.75 to 14.25
Southern Coke, No. 1 Soft	15.25 to 15.75
Southern Coke, No. 2 Soft	14.75 to 15.25
Southern Coke, Gray Forge	13.25 to 14.25
Southern Coke, Mottled	13.25 to 14.25
Ohio Silvery, No. 1	20.15 to 21.15
Lake Superior Coke, No. 1	16.15 to 16.65
Lake Superior Coke, No. 2	15.65 to 16.15
Lake Superior Coke, No. 3	15.15 to 15.65

Car Wheel and Malleable Irons.

Standard Southern Car Wheel	$25.75 to $26.25
Lake Superior Car Wheel and Malleable	23.00 to 23.50

German Iron Market.

ESSEN, August 22, 1903.

At the beginning of the month the tone of the German Iron and Steel market was rather uncertain, caused principally by the reports from the American Iron market and from Wall street. Since then, however, the better feeling of the market mentioned in our last report has made further progress, and the best proof is that there have been sales of Pig Iron for next year's delivery. The business in Ores is naturally quiet, as the output of the mines up to the close of the year has been sold. The Pig Iron market during the last few weeks has been very active, and prices of Foundry Pig have advanced 1 mark per ton without disturbing the good business. Shipments from blast furnaces are heavy, and the supplies of Pig Iron at the mills are reduced to a minimum, especially in the Luxemburg-Lorraine districts. Prices of Pig Iron to-day are as follows: Spiegeleisen with 10 to 12 per cent. manganese, 67 marks; Mill Iron, 56 marks; Iron for Open Hearth, 58 marks, all per ton at Siegen; Foundry Pig No. 1, 67.50 marks; No. 3, 65.50 marks; Bessemer Pig, 68.50 marks; Thomas' Basic Pig, f.o.b. Steel works, 57.40 to 58.10 marks; Luxemburg Mill Iron, 45.60 to 46.40 marks; Luxemburg Foundry Pig No. 3, 52 marks, at Luxemburg; English Foundry Pig No. 3, 66 marks, f.o.b. Ruhrort.

The market for Intermediate Steel Products, Beams and Bars is quite lively. It is remarkable that during the last 8 to 14 days, in spite of discouraging reports from the American Iron market, the demand for export has steadily increased, principally from Scotch sources, and in consequence the pretty low export prices which ruled formerly are gradually assuming an upward course. Important inquiries are coming from abroad daily in quantities of 10,000 to 25,000 tons, which are followed by many transactions. We conclude therefrom that there are still large contractors abroad who are short of supplies, and are obliged to look to the German market for relief.

The German Iron and Steel mills that formerly sold individually to the export trade and thus competed with one another in every transaction, have since come to an understanding of charging a uniform price, and now hold prices at from 3 to 4 marks higher per ton. In this manner the mill owners wish to put an end to the intolerable condition of free competition. This is to be stopped by the combine of Steel mills now soon to be accomplished, but they think

they can anticipate the combine backed by the present brisk demand. This agreement in prices is of great importance not only to the individual mill owners, but for the entire German Iron and Steel market. Justice is also done the smaller mills who are dependent upon orders for Intermediate Products and to allay their complaints concerning the low export selling prices of their products. For home consumption prices remain unchanged, even for contracts until the close of the year. The drawback on export shipments has been granted until the end of the year. Prices are as follows: Ingots, 77.50 marks; Blooms, 82.50 marks; Billets, 90 marks; Slabs, 92.50 marks, all per ton, f.o.b. Dortmund, Ruhrort, Rothe Erde and Diedenhofen for Thomas' Soft Steel; Open Hearth material 5 marks additional per ton, and correspondingly higher prices are paid for hard Bessemer Billets. Iron Bars are in good demand. Soft Steel Bars are quoted at 107.50 to 112.50 marks, while Iron Bars fetch 120 marks per ton at the mill. In Skelp the mills are busy; Skelp of Soft Steel sells at 121 to 126 marks, Skelp for Gas Pipes at 125 to 128 marks, better grades correspondingly higher.

In Plates and Sheets orders are scarce, and there is little doing, and prices remain unremunerative as heretofore.

The Wire market is busy with orders for export, and in spite of keen competition prices are well sustained. For the home market we quote: Soft Steel Wire Rods, 120 to 122.50 marks; Iron Wire Rods, 135 to 137.50 marks; Ordinary Drawn Soft Steel Wire Rods, 130 to 137.50 marks; Wire Nails, 160 to 165 marks.

For Rails there are continually large orders in the market, including some for the Pacific Coast of the United States.

In the machine and construction shops occupation is very irregular, and the majority of the factories are greatly in need of orders. Boiler factories are not busy, and are feeling the increased introduction of large gas motor engines.

Trade Publications.

"Pumping by Compressed Air" is the title of a pamphlet by the Pneumatic Engineering Company, 128 Broadway, New York. The principle of the air lift method of pumping is familiar to our readers. Air under pressure is conveyed into the lower end of the water pipe through a suitable foot base. After the standing water column has been thrown off the air rises through the water, reducing the weight of the column, with the result that the water is expelled as fast as the well supplies it, the water outside of the pipe acting as a head flowing into the discharge pipe by force of gravity. The Titus method of accomplishing this, patents of which are controlled by this company, is fully mentioned in the pamphlet.

Small Tools.—We have just received from the Pratt & Whitney Company, Hartford, Conn., a catalogue of the output of their small tool department, including taps and dies, die stock sets for bolt and pipe threading, milling cutters, slitting saws, lathe tools, reamers, &c. Their inserted blade milling cutters are meant for both hand and face milling. The bodies are cast iron and the inserted blades of a high grade of alloy steel. In large cutters a much more durable tool can be made in this way than from the solid stock. The catalogue contains complete descriptions and dimensions of all of the various sizes of the above mentioned tools.

"Steam Specialties," including pressure regulators, steam traps, back pressure valves, balance and relief valves, is the title of a pamphlet by Klipfel & Thomas Company, Chicago.

Motors for Automobiles.—The gasoline motors built by H. L. F. Trebert & Co. Rochester, N. Y., are of the four-circle type of two and four cylinders. The valves are unusually large and both are mechanically operated. The entire heating surface of the cylinders has a water circulation. The transmission gear is very simple and is designed for direct drive. It has three speeds forward and one reverse, operated by one lever. The gears are of steel forgings, accurately cut and case hardened. These motors are made in sizes up to 20 horsepower.

Motor Cars.—A neat brochure by the H. H. Franklin Mfg. Company, Syracuse, N. Y., describes their motor car. This is a rather light gasoline car of 1100 pounds, having a speed of 30 miles an hour, with great hill climbing power. It runs with extreme smoothness and lack of noise and is, perhaps, the most easily controlled and flexible of motor cars. The four cylinders of the motor are cooled by air. The superior advantages of this system were illustrated in the 500-mile reliability contest between New York and Boston, during which, out of 56 machines, there were 27 stops, losing 693 minutes on account of troubles with the cooling systems. The Franklin air cooling method did not cause a stop.

Mining and Quarrying Machinery.—We have before us a handsomely illustrated, well arranged and very complete catalogue by the Ingersoll-Sergeant Company, 26 Cortlandt street, New York, covering their rock drills, mining and quarrying machinery. A marked peculiarity of all machinery built by this company is its extreme simplicity and absence of complication, and the ease with which any part can be reached with a minimum disturbance of other parts. Such machinery can be put into the hands of an ordinarily skillful man with the greatest success and is not like inferior appliances, at a disadvantage with slight work. This company have had a wide experience in percussive machinery through the development of the rock drill, the channeling machine and coal cutter, during a period covering over 30 years. They have built and sold over 45,000 rock drills, and their capacity to-day at their two large plants is about 300 per month, while their capacity for air compressors is greater than that of any other maker in the business. Their present designs are the result of this experience, and, as will be appreciated, are superior in every respect.

Hand-Book for Founders.—H. L. Williams, resident partner at Chicago of the firm of Hickman, Williams & Co., has written and compiled a neat hand-book containing valuable information which will be found of special interest to founders. The article on iron and its metalloids is the fruitage of long years of experience in blast furnace and foundry practice, and especially an intimate study of iron mixtures at close range. Approximate analyses are given of the various brands of iron for which the firm are selling agents and in some of which they have a proprietary interest. Blank analyses pages also have been provided as a convenient means for compiling analyses of other pig iron and coke. The book is printed on light weight paper, bound in flexible leather with round corners, making it convenient for carrying in the pocket.

Elevators.—The Otis Elevator Company of Chicago have prepared an exceedingly attractive catalogue dealing with the various types of elevating devices which are now built by them. They employ two systems of control for electric elevators—namely, the electrical and mechanical. In the former the elevator is controlled by a small switch within the car, operating pilot circuits which open and close the main line and reversing switches. On starting there is considerable resistance within the armature circuit, and as the motor accelerates this resistance is automatically cut out step by step by electrically operated switches. By this means the current is absolutely prevented from increasing above the amount for which the motor is designed, and a gentle start proportionate to the load is secured. In the mechanical system the line switch is opened, closed and reversed through the medium of a lever or hand wheel within the car by purely mechanical means.

Oiling Systems.—The Pittsburgh Gage & Supply Company of Pittsburgh, Pa., have prepared circulars descriptive of their oil filters, exhaust heads and their continuous oiling system. In this system of lubricating engine bearings the oil is handled mechanically, the bearings are kept flooded, and after passing through the bearings the oil is collected and perfectly purified for use over again. In this method there is no waste of oil, the lubrication is perfect, and the bearings require no attention whatever.

Screens.—We have received from the Sturtevant Mill Company of Boston a circular illustrating their toggle operated screen, which occupies a floor space of only 2 feet 9 inches by 6 feet 7 inches and screens from 4 to 100 mesh. The wire can be changed in a very few minutes and the output may be varied, coarse or fine, by simply changing the pitch. The weight of the screen box and material is carried on springs and a toggle mechanism is introduced to produce the vibration.

We have received from the Kelly & Jones Company of Pittsburgh, Pa., manufacturers of iron pipe fittings, a bound catalogue of 800 pages, covering their brass and iron valves, brass and iron cocks, &c., for steam, gas, water, oil and air. It also describes mine, mill, factory, contractors' and railway supplies and oil well and natural gas appliances.

Ryerson's *Monthly Journal and Stock List*, by Joseph T. Ryerson & Son, Chicago, Ill., contains a very complete list of steel sheets, rivets, bars, shears, punches, flanging machines, patch bolts, stay bolts and general supplies.

Bulletin No. 32, by the Northern Electrical Mfg. Company, Madison, Wis., describes their new steel crane motor, which is dust proof and wound for any particular service.

We have received a circular from the Falls Hollow Stay Bolt Company, Cuyahoga Falls, Ohio, giving the results of tests made of their hollow and solid stay bolt iron at McGill University, Montreal, and also the result of vibrate tests made at the Grand Trunk shops, Montreal. The results show that this iron stands easily at the head of the list of those tested, and they also indicate the superior and uniform quality of the product of this company.

The sales department of the Crucible Steel Company of America, at Pittsburgh, state that they have a very heavy demand for their Rex brand of tool steel. The sales department recently issued a folder calling attention to the merits of the new steel, and they expect to issue soon a larger pamphlet containing reports and details of shop practice with Rex steel.

A German economist, Professor Jastrow, has written an essay in which he augurs a bright future for German industries resulting from the amicable relationship existing between German workingmen and their employers, whereas he points to the disastrous consequences threatening American industries from the gigantic strikes and lockouts so frequently occurring in the United States.

The New York Machinery Market.

NEW YORK, September 9, 1903.

Machinery merchants are expectant of a resumption of business activities within a very short time, now that the summer vacation season has been brought to an end. The general demand is still unchanged, and a condition of quietness prevails. The number of large propositions calling for considerable quantities of machinery has been increased, and is now so formidable as to inspire hope of some very good business in the near future. Machine tool merchants are particularly optimistic as to future business. One evidence of the strength of this branch of the trade is found in the fact that the Cincinnati Milling Machine Company and the Brown & Sharpe Mfg. Company have both agreed upon an advance in prices on certain sizes of their milling machines. The advance has gone into effect, and it amounts to about 5 per cent. on machines of the most popular sizes. It also affects certain attachments.

The tone of the market in general as to values is very strong in consideration of the falling off of demand, which characterized the last few months. There have been slight concessions in certain instances of late, but the reckless cutting of prices as soon as business falls off seems to be a thing of the past.

The attention of the machine tool trade has again been directed toward Canada during the last week or so. Some say nice orders are soon to be dealt out by the Canadian Pacific Railway. That the matter is about ripe is evidenced by the fact that representatives of all of the large machinery houses are now in Montreal. E. W. Bender, the general purchasing agent of the system, has his offices there. It is expected that considerable business will be forthcoming from this quarter for some time, as the company contemplate embarking very extensively in the building of their own rolling stock. Heretofore they have been compelled to purchase their locomotives and cars in this country to a very large extent, and were of course hampered by the heavy duty.

In connection with the contemplated improvements the report of President Shaughnessy of the road, made public to-day, has some interesting information. The report says in part:

"To meet the pressing requirements of settlers, many of whom came into the country during the past two years, your directors authorized the construction of a railway between Regina, on the main line, and Arcola, the present terminus of the Pipestone Branch, a distance of about 113 miles, and an arrangement has been made whereby the Manitoba and Northwestern Railway will be extended an additional distance of 30 miles. You will be asked to approve the construction of these lines and to authorize the creation and sale of sufficient 4 per cent. consolidated debenture stock for the purpose. Of the proceeds of the sale of $19,500,000 ordinary shares, there had been expended to the end of the fiscal year $17,228,953, and there were orders outstanding for cars and locomotives undelivered amounting to $4,221,865. Since then additional orders have been placed to the amount of $1,351,000, and it is proposed to continue the policy of increasing the rolling stock equipment as rapidly as circumstances will permit, until the company is well ahead of its immediate requirements. When these contracts have been filled the proceeds of the issue of common shares, as well as the amount of $3,000,000 appropriated from surplus earnings, will have been absorbed. The cost of cars and locomotives purchased during the last couple of years has been substantially increased, because of the necessity for getting so many of them outside of Canada and paying the Canadian duty on their importation. In the near future, when your own shops have been completed, it is expected that you will be able to build yourselves most of the cars and locomotives required, thus saving the manufacturers' profit and the duty. Your directors will ask authority to expend $5,000,000 during the next year on various classes of equipment in addition to all orders that have been placed up to this time. Many of the new works on which capital has been expended are being carried out on a more comprehensive scale than was originally contemplated, and the increase of nearly 50 per cent. within three years in the tonnage moved annually has made it imperative that you should, for the convenience of the public and your own financial advantage, provide forthwith many additional facilities, calculated to assist in promoting promptness and economy in the handling of your traffic, that under ordinary conditions might have been spread over a number of years. Notwithstanding your large outlay in the past for lands, tracks, buildings, and other works at your more important terminals, like St. John, Montreal, Toronto, Ottawa and Winnipeg, the facilities at most of these points are quite inadequate for present demands, and, as a result, there is frequent congestion, resulting in inconvenience and expense to everybody concerned. With a view to remedying these conditions, and in order that the work of bringing your property to a high standard of efficiency may be continued without cessation, you will be asked to authorize the directors to expend capital for these general purposes to an amount not exceeding $4,500,000."

The specific work now in hand is the expenditure of $1,000,000 in the erection of large shops at Winnipeg, Canada. The following buildings will be erected: Office and storehouse, 85 x 260; foundry, 100 x 100; oil house, 40 x 80; blacksmith shop, 100 x 200; freight car shop, 100 x 400; passenger car shops, two buildings, each 100 x 205; power house, 100 x 100; planing mill, 100 x 200; drying kiln, 35 x 80, and locomotive shop, 162 x 700 feet. It is for the equipment of these buildings that orders will soon be placed.

Another matter of importance in this connection is the decision of the company to use steam turbines for propelling all of the great lake steamers which are operated under the Canadian Pacific system. We understand that the British firm of Brown, McFarlane & Co. intend establishing a factory in Canada for the building of these turbines, and, of course, to further their adoption generally throughout the Dominion for power purposes. This is said to be a project fathered by Sir William C. Van Horne, chairman of the Board of the Canadian Pacific Railway.

It will be recalled that the Grand Trunk Railway Company will also build extensive shops in Canada. This project has been receiving the attention of American machinery merchants for some time, but we have not heard that the orders for equipment have been placed as yet.

It is generally believed in the trade here that the bulk of this prospective machinery business will come to this country, as owing to the great activity in Canada in the way of building new shops the Canadian machine tool builders have their shops filled with work, and a considerable length of time will be required to execute the orders already booked.

Considerable interest is manifested in the estimates submitted to Rear-Admiral Endicott, Chief of the Bureau of Yards and Docks for the improvements and expenditure at the various navy yards for the fiscal year ending June 30, 1905. These estimates include: New York, total amount $3,624,714, which includes coal storage and coal handling facilities, $175,000; Pensacola, total, $2,554,515, including central power house, $104,500; machinery for the same, $115,000; concrete and granite dry dock, $1,400,000; Charleston, total, $3,640,000, which includes power house and equipment, $135,000; coaling pier and plant, $250,000; floating crane, $100,000; dry dock, $350,000; ship fitters' shop, $150,000; smithery, $150,000; boat shop, $110,000; Port Royal, total, $4,899,246, including two stone and concrete dry docks, $2,200,000, and railroad from Burton Hill to station, $258,000; New Orleans, total, $3,816,190, including electric light and power plant, $250,000; railroad system, $117,000; boat shop, $125,000; ordnance shop and offices, $120,000; Puget Sound, total, $3,096,054, which includes new dry dock, $1,600,000; San Juan, Porto Rico, total, $2,617,180, including dredging and machinery, $250,000; dry dock, $1,250,000; power house, $120,000; equipment and ordinance, $250,000; for the improvement at Pearl Harbor, Hawaiian Islands, close on to $5,000,000 is desired. Eighteen thousand dollars is to be spent for drilling three artesian wells. A pumping plant is to entail an expenditure of $50,000. A water pipe system and stand pipe are expected to cost $40,000. The same amount is to be spent in a sewer system. Store houses will cost $150,000. A machine shop will mean the outlay of $150,000 for construction and equipment. A foundry will cost $50,000. A yard and docks shop is put at $150,000. A similar sum will be absorbed in the construction of two wharves. Dredging is put at $100,000. An electric plant will incur an expense of $150,000. For the purchase of tools and appliances $45,000 will be laid aside. Railroad and rolling stock will cost $100,000. The construction of the dry docks is calculated to cost $3,250,000.

The following awards have been made for supplies for the Eastern yards, bids for which were opened August 25:

Thompson Electric Company, Chicago, Ill., Class 7, three direct current buffing motors, $580.

Hili, Clark & Co., Boston, Mass., class 9, one improved vertical friction drill, $200; class 10, one screw cutting engine lathe, $644.90; class 11, one electric motor tool grinder, $99; class 20, one 24-inch hollow spindle pattern makers' lathe, $450.

American Tool Works Company, Cincinnati, Ohio, class 12, one direct electric driven engine lathe, $2675.

Fox Machine Company, Grand Rapids, Mich., class 14, one 36-inch band sawing machine, $137; class 24, one miter and trimming machine, $21; class 25, one band saw brazer, $12.

American Hoist & Derrick Company, St. Paul, Minn., Class 15, one 10-ton steam locomotive crane, $6945.

Prentiss Tool & Supply Company, New York, class 16, one improved jointing and facing machine, $437; class 17, one improved quick acting jig or scroll saw, $313.

S. A. Woods Machine Company, Boston, Mass., class 18, one combined revolving mandrel frame saw bench, $700; class 19, band saw machine, $585.

Cutler, Wood & Stevens Company, Boston, Mass., class 26, one motor driven polishing and buffing machine, $300.

Manhattan Supply Company, New York, class 27, one motor driven buffing and polishing lathe, $324.40.

Crocker-Wheeler Company, Ampere, N. J., class 28, one 20 horse-power electric motor, $408.

Class 21, one band saw filing machine; class 22, one circular saw filing machine; class 23, one circular saw setting machine. No awards.

The following bids for supplies for the Western yards were opened September 1 at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.:

Bidder 14. Harron, Rickard & McCone, San Francisco, Cal.
17. Pacific Tool & Supply Company, San Francisco, Cal.
35. Holbrook, Merril & Stetson, San Francisco, Cal.
38. Manning, Maxwell & Moore, New York.
46. Eby Machinery Company, San Francisco, Cal.
49. Tatum & Bowen, San Francisco, Cal.
60. George H. Tay & Co., San Francisco, Cal.
61. Henshaw-Buckley Company, San Francisco, Cal.
72. George A. Ohl & Co., Newark, N. J.
84. Niles-Bement-Pond Company, New York.
85. American Tool Works Company, Cincinnati, Ohio.

Class 65. One standard gas machine. No bids.

Class 66. One combined wire, stringer, feed and cutter—Bidder 35, $58; 61, $122; 14, $138; 38, $212 and $100.

Class 67. One tenoning machine No. 3—Bidder 38, $185; 14, $198.50; 46, $200; 61, $240 and $260; 49, $269.50.

Class 68. One two sided sticker or molder—Bidder 61, $260; 49, $295; 46, $298.

Class 69. One power gang punching machine—Bidder 61, $495; 17, $500; 72, $1223; 14, $1334.

Class 70. One engine lathe—Bidder 85, $972 (?); 38, $1150; 17, $1200.

Class 71. One sheet metal worker's spinning lathe—Bidder 17, $400; 14, $465; 61, $470; 38, $580.

Class 72. One emery grinder—Bidder 38, $192; 17, $225.

Class 73. One heavy sheet metal power bending break—Bidder 38, $1300; 61, $1345; 72, $1936.

Class 74. One slip roll forming machine—Bidder 60, $84; 61, $85 and $100; 14, $90; 38, 90; 35, $92.

Class 76. One pan forming machine—Bidder 61, $155; 17, $175.

Class 77. One engraving machine—Bidder 17, $525; 61, $565 and $815.

Class 78. One steam engine driven ship plate bending roll—Bidder 38, $16,235; 84, $18,010.

Plans are about to be prepared by the engineering department of the Schenectady Railway Company of Schenectady, N. Y., for a large, new repair shop. It is contemplated to erect a shop 250 feet in width and 300 feet long. It will be of brick construction, on a foundation of concrete. E. F. Peck, general manager of the company, advises us that specifications for equipment have not been prepared as yet.

We are advised that the report that the De Lamar Copper Refining Company have purchased 3000 horse-power of Babcock & Wilcox boilers is entirely incorrect, and that Thayer & Co., Incorporated, of 39-41 Cortlandt street, have furnished the entire boiler equipment for the plant of this company at De Lamar, N. J., including the present increase.

John A. Caldwell, general sales agent Wilkinson Stoker Company, 45 Broadway, N. Y., has received an order from the Federal Sugar Refining Company, Yonkers, N. Y., for the complete stoker equipment for 13 300 horse-power Heine boilers, which were recently ordered.

The firm of Arthur Koppel, New York, have been awarded the contract for the building and equipping of a narrow gauge railroad, about 400 miles long, by the Otavi Mining & Railroad Company. The railroad is to be used in the service of the copper mines in the district of Otavi and Tsumeb, in Southwestern Africa. The total cost of building the road is approximately $4,500,000. The firm of Arthur Koppel have formed a company with several of the first German banks to build this road, which has to be finished within two and one-half years. Arthur Koppel will build and equip the road complete, including rails, steel ties, rolling stock and all the other equipment. By one of the last steamers 15 engineers of the firm have left Hamburg for Southwestern Africa in order to begin the work.

Stone & Webster, Boston, Mass., announce the removal of their offices to the ninth, tenth and eleventh floors of the newly constructed India Building, 84 State street, corner of Merchants' Row.

New York.

NEW YORK, September 9, 1903.

Pig Iron.—The volume of daily business is not as large as sellers would like to see it. Inquiry is good, but consumers confine their purchases to moderate sized quantities, simply to meet their current requirements. The sales of the week include a few lots running as high as 1000 tons, but these are exceptional. Included in the sales reported for the week were scattering lots of Basic Iron. A tendency to request shipments to be held back is noted. An exception to this, however, is observed in the case of the Pipe foundries, who are quite generally urgent in their requests for more rapid delivery. Rolling mills are prominent among the consuming interests asking for delayed deliveries. Stocks at Northern furnaces are not heavy, and if competition from the South does not increase it is expected that the local furnace interests will be able to dispose of their output for the remainder of the year. Prices show only slight reductions on previous quotations. We quote, at tidewater: No. 2 X Foundry, $16.25 to $16.75; No. 2 Plain Foundry, $15.75 to $16.25; Gray Forge, $15.25 to $15.75; Basic, $15.50 to $16. Tennessee and Alabama brands: $16.75 to $17 for No. 1, $16.25 to $16.75 for No. 2, $15.75 to $16.25 for No. 3.

Steel Rails.—Nothing of importance has transpired in this connection. Standard Rails are firmly maintained at $28, while Light Rails are slightly lower and quoted at $30 to $32.

Finished Iron and Steel.—Quite a number of contracts are now in the market, principally for buildings in this vicinity, and some bridge work is also in sight. Much more activity is noted in local preparations for the resumption of building operations. The Plate trade is quiet, but inquiries are being received for fair quantities and the outlook is encouraging. Bar Iron is moving in fair volume, but prices continue decidedly irregular. We quote, at tidewater, as follows: Beams, Channels and Zees, 1.75c. to 2c.; Angles, 1.75c. to 2c.; Tees, 1.80c. to 2c.; Bulb Angles and Deck Beams, 1.90c. to 2.25c. Sheared Steel Plates, in carload lots, are 1.78c. to 1.85c. for Tank, 2c. to 2.10c. for Flange, 2.10c. to 2.20c. for Marine and 2.25c. upward for Fire Box. Refined Bars are 1.60c. to 1.80c.; Soft Steel Bars, 1.70c. to 1.80c.

Old Material.—The market continues very dull. Only small lots are being sold, and concessions are necessary to effect sales. It is rare that a transaction runs above one or two carloads. Quotations are nominal, but approximate figures are as follows, per gross ton, New York and vicinity:

Old Iron Rails	$18.00 to $19.00
Old Steel Rails, long lengths	17.00 to 18.00
Old Steel Rails, short pieces	15.50 to 16.00
Relaying Rails, heavy sections	22.00 to 23.00
Old Car Wheels	16.00 to 17.00
Old Iron Car Axles	20.00 to 21.00
Old Steel Car Axles	18.50 to 19.00
Heavy Melting Scrap	15.50 to 16.00
No. 1 Railroad Wrought Iron	16.00 to 17.00
Iron Track Scrap	15.50 to 16.00
Wrought Pipe	11.00 to 11.50
Ordinary Light Iron	8.00 to 8.50
Cast Borings	6.00 to 7.00
Wrought Turnings	11.00 to 11.50
No. 1 Machinery Cast	15.00 to 15.50
Stove Plate	8.50 to 9.00

Metal Market.

NEW YORK, September 9, 1903.

Pig Tin.—Throughout the entire week the market has been very weak and prices have declined steadily. The market was, in fact, neglected completely. Business from consuming interests was even smaller than it has been at any time for a number of weeks past, and the speculative element, who have been keeping up interest in this article of late, abandoned the market. At this writing spot is 26.60c. to 26.85c., while September deliveries are obtainable at from 26.37½c. to 26.62½c. The present spot price shows a decline of 50c. as compared with last week. The London market shows a decline of 15 shillings, to-day's cables naming £122 for spot and £121 for futures.

Copper.—The only change in this market is that the "official" prices are being shaded a little more than usual. It is now possible to obtain the metal from ¼c. to ⅜c. lower than the "official" quotations, according to quality. The market is still very dull, and there is scarcely any business beyond the retail orders. The prices quoted on the New York Metal Exchange are unchanged and as follows: Lake, 13.75c. to 13.87½c.; Electrolytic, 13.62½c. to 13.75c.; Casting, 13.37½c. to 13.50c. London has declined, as follows: Spot, £57 17s. 6d.; futures, £57 2s. 6d.; Best Selected, £63 5s.

Pig Lead.—The market is firm, and outside lots of spot are held at figures somewhat higher than those of last week. The prices of the American Smelting & Refining Company are unchanged, being on a basis of 4.10c. for 50-ton lots and 4.12½c. in carload lots. Outside lots of spot are now quoted here 4.35c. The London market has advanced slightly to £11 6s. 3d.

Spelter.—The market is strong and unchanged, and spot to August closed to-day at 6c. The London market has advanced, being quoted to-day £21 2s. 6d.

Antimony.—Cookson's is easy at 7.25c., while Hallett's is unchanged at 6.37½c., and other brands at 6c. to 6.25c.

Nickel—Is quoted at 40c. to 45c. for large quantities, and 50c. to 60c. in small lots.

Quicksilver.—The market continues at $47.50 for flasks of 76½ lbs. London cables £8 10s.

Tin Plate.—The market is quiet. The American Tin Plate Company quote $3.80 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, equivalent to $3.99, New York. English cables are 11 shillings 7½ pence for Plates in Wales, a decline of 3 pence.

The Small Converter Process for the Manufacture of Steel Castings.*

BY ARTHUR SIMONSON, PHILADELPHIA, PA.

The Object in View.

The end and aim of all the small converter processes which have been introduced in recent years are the same. It is the production of castings on a smaller scale than can be economically done by either the Bessemer or the open hearth process, and at the same time to fill a vacant field left by them—namely, the manufacture of the small and intricate castings which are becoming more and more needed to give strength to parts of machines and engines that have to stand greater strains and give higher service than ever before. And it has been in the natural sequence of events that as it becomes more and more possible to obtain light, strong steel castings they have been increasingly specified, until now it seems to be taken for granted by some engineers that nothing is too difficult to be made in steel. How far this has been realized we shall see from the course of this paper. It is the opinion of the writer that in the process to be fully described later somewhere near the limit of probable requirements has been reached, as unless we are called upon to cast pins and needles we have little difficulty in making steel hot enough to run into the molds.

The problem before all inventors was to make genuine steel in small quantities, which could be employed in small jobbing foundries, could be shut down like a cupola without any expense, could be handled in small ladles like gray iron, and would not be prohibitory in cost. That it was a difficult problem will be seen from a glance at the patent records, which contain the tombstones of many buried systems, all of which, according to their inventors, would solve the problem and revolutionize the steel castings business. How is it that these inventions got no further than the archives of the Patent Office? Simply because they failed to realize in actual practice the advantage claimed for them. They just would not work. The cost of the plant or its maintenance was too high, the product irregular, the method was too difficult to handle, and the inevitable result followed—they were abandoned. There are to-day in sundry junk piles the relics of some of these inventions, which, like milestones, mark the path of progress.

Different Methods of Blowing.

In all the small converters, with few exceptions, the method of application of the blast is different from the Besemer—that is to say, instead of blowing through the bottom of the converter it is directed through the side, on the top, or above the metal, sometimes blown up through the metal at an angle, or down on its surface. In the Bessemer converter a very high pressure has to be maintained in order to support the weight of the bath and prevent the iron from running into the tuyeres. This produces a violent agitation of the metal, introducing a much greater volume of air than is necessary for the actual oxidation of the elements which it is desired to remove. The result is a tendency to the production of blowholes or spongy steel, the presence of which is ruinous in the manufacture of castings, as they cannot be reheated and rolled as in the case of ingots to close them up.

Later inventors following in the footsteps of Bessemer naturally considered that this agitation was necessary to the thorough refining of the metal, that the bath must be disturbed so that the blast can reach every part. It was precisely this that was one of the great reasons of their failure. The bath can be thoroughly purified while remaining perfectly tranquil, at least so far as the action of the blast directly tends to disturb it, and therefore it is not necessary for the oxidation of the carbon, silicon and manganese to be removed. The result of such a system would naturally be sound steel and a much higher temperature on account of not having to heat all the excess of air used to agitate the bath.

An examination of the drawings of most of the small converters and the written claims made for them will show that the object of the inventors was to agitate the bath. The tuyeres were sometimes movable on a pivot so that they could be changed about during the progress of the blow, or the converter was moved so as to bring the blast into action on different parts of the bath. The motion was either tumultuous or rotary, and in some cases even baffle plates of refactory material were introduced into the converter to change the direction and increase the agitation.

So much, then, for abandoned processes. Let us see what are the requirements of modern practice, and how far they can be met.

The field to be filled by the process is specially the manufacture of small castings, say below 100 pounds in weight, although castings up to 12 tons have been profitably made. It is probable that down to a limit of about 100 pounds the open hearth can handle everything with greater economy than any other process, provided there are enough larger pieces along with them and enough work of all kinds to keep going continuously. There has been great difficulty in getting small pieces from the open hearth people, and hence all small parts that could possibly be made that way were made in cast iron, malleable iron or semisteel. But the small converter process aspires to supply the real thing to make the castings of genuine steel, of high tensile strength and ductility, of similar chemical analysis to the open hearth, easily machined, sound and true to pattern and capable, if necessary, of being forged and welded. After ten years of experience with the Tropenas process the writer can say that that process meets all the requirements satisfactorily. Let us look for a few moments at its history, which has been memorable in point of the gradual adaption and the increasing favor with which it has been received.

In 1890 Edgar Allen & Co. of Sheffield, England, made an arrangement with Mr. Tropenas of Paris to erect his first experimental converter in their works. About this time the writer's acquaintance with Mr. Tropenas and his connection with the process commenced. The first converter had a capacity of about 800 pounds, and was commonly referred to as the baby. The baby has now grown to be a healthy adult, having displaced in its growth a Robert converter and a Siemens gas crucible furnace at Allen & Co.'s, and two or three Siemens-Martin open hearth furnaces at the Royal Woolwich Arsenal, London, where it was installed later. Allen & Co. now manufacture 600 tons of miscellaneous castings per month for every department of the British Government and railways, so it will be seen that the product meets all specifications. After being put in operation in a large number of plants in Europe the process was introduced into this country about four years ago, and has become increasingly popular ever since. Recently a plant was started at the Navy Yard in Washington, and other plants are in course of erection in various parts of the country. The output has steadily increased, the applications of the product have become more and more varied and the castings are giving very good satisfaction.

Description of Plant and the Operation.

The Tropenas process and plant consists of a converter, blower and cupola. The converter, which is a sheet steel shell lined with silica brick, has generally a capacity of about 2 tons, and the daily output of one of these converters may be made to vary from 2 tons to as much as 20 tons. Needless to say, the nearer the plant is run to its full capacity the greater will be the economy. There are two rows of tuyeres placed horizontally in the lining and extending round a portion of the circumference. In operation the level of the metal is just at the lower edge of the tuyere openings and the arrangement of the tuyeres in the horizontal plane is such that the possibility of rotary motion or agitation is reduced to a minimum. The main intent of the construction of the converter is to keep the bath quiet and introduce just sufficient air to oxidize the metalloids, leaving all mechanical action to be originated within the metal itself by dilution and diffusion.

The cupola, which is from 30 to 40 inches diameter, in American practice, generally stands on the floor adjacent

* Paper read before the Philadelphia Foundrymen's Association, September 2, 1903.

to the converter, and the mixture of pig iron and steel scrap after being melted is tapped out into a ladle and transferred by a crane to the converter. In some cases the cupola is elevated above the level of the top of the converter and the metal tapped direct into the converter by means of a portable spout. This is its only advantage, and it has the disadvantage of having to elevate all the stock to a very great hight. If the cupola is on the floor the metal can be measured accurately in the ladle, or weighed with a suspended weighing machine, and the cupola can be used for melting gray iron or for any other purpose when not making steel. The cupola is just the same as any other, except that the tuyeres are placed higher than usual above the bed, so as to collect about the required amount for the blow before tapping out. Its capacity is about 5 tons an hour.

Before commencing the blow sufficient iron is melted and tapped into the ladle to bring the level of the metal up to the bottom of the tuyeres, when the converter is rotated up to a very small angle from the vertical. The reason the converter is not placed quite vertical is that as the blow progresses the metalloids are burned out, reducing the weight of the bath, and the level falls slightly. Then by rotating the converter it may be constantly kept up to the bottom edge of the tuyeres. The slight angle also serves to guard against the iron flowing into the tuyeres very far if the converter should accidentally be turned up a little too much.

As soon as the position of the vessel is adjusted the blast at about 3 pounds pressure is turned on from a positive pressure blower, and after a period ranging from 15 to 25 minutes the converter is turned down and the blast shut off. The condition of the flame, sparks and smoke tells the operator when the blow is finished, and there then remains in the converter a bath of practically pure iron at a temperature of about 3300 degrees. A final addition is then made of ferromanganese, silicon or pig iron, as the case may be, to recarburize the bath to the desired point, and it is ready to be poured into the molds. The amount of final addition to be added varies from nothing to several hundred pounds, and the best means to add it have to be decided in each case, according to the quantity. Sometimes a small cupola is used to melt it. Sometimes it is added cold in the form of pigs. My own practice is a combination, because in the class of work we commonly make we need an addition of about 400 pounds.

The method is to add the required percentage of manganese, in the form of ferromanganese, direct into the bath in the cold state. The amount is weighed out accurately in as few pieces as possible, and as soon as the converter is turned down at the end of the blow a helper dips the ferromanganese in water and throws it into the mouth of the furnace. The water on the surface makes a small explosion as it strikes the slag, parting it, and the ferromanganese passes through. Otherwise it would be liable to become wrapped up in the slag and would not melt. This method of adding manganese is very accurate and economical, for if manganese is melted in the cupola as much as 30 per cent. of it may be lost, and the loss is at best irregular, giving various results in the finished steel. Adding it cold, as above, there is no loss except what is caused by the slight deoxidation of the bath. For the addition of carbon and silicon we add a quantity of the iron mixture from the cupola which melts the iron for the converter. This mixture is carefully calculated and runs with absolute regularity, and is therefore a very good base to use for the addition of these elements.

If the iron is hot and the position of the converter properly adjusted, it is a matter of difficulty almost to make bad steel or have a failure with the Tropenas process. To show the elasticity of the process I may say a word or two about difficulties that may arise through accident or the carelessness of the operator, and how they are generally overcome with ease. Perhaps the cupola is not working right, and the iron is dirty and not too hot. The result is that nozzles of slag form on the front of the tuyeres, gradually closing them up, and tending to make the action very much slower, if not stopping it altogether. This will not occur, as I say, if things are running right; but, if it should, just turn down the converter, and shut off the blast, and with a long bar knock off the nozzles, turn up the vessel and go ahead again. By this time the iron is hotter, and there will be no further trouble.

Or perhaps the power plant is sorely taxed to keep all the different departments of the works running, and sometimes the load gets too great. In the middle of a blow out flies the circuit breaker, and the blast stops. This is a situation that would paralyze a Bessemer converter. The Tropenas operator immediately throws over his controller, and owing to the construction of it, and the fact as already stated that the iron is never above the tuyeres, it cannot run into them, but possibly a little slag may, and hence the turning down. When the circuit is closed again the vessel is turned up and blowing resumed. It does not disturb the flame to any great extent, and will not alter the indications at the mouth of the converter. In fact, the writer turned down the converter seven times for the purpose of taking samples at different stages of the blow, as will be demonstrated later, without any difficulty or any appreciable cooling of the steel.

The most difficult case to manage probably was when at the end of the day's run there was not enough iron melted in the cupola to bring it up to the level of the tuyeres for the last blow. We turned the converter over after putting on the blast until the tuyeres were submerged as in the Bessemer process, and put on all the wind we could get out of the blower. Then, as the iron got a little hotter, we threw in pig after pig at the converter's mouth, rotating the converter back toward the vertical with each addition and lowering the blast, until finally we go normal Tropenas conditions, and the blow proceeded as usual. This case was remarkable because simply by the initial heat of the iron and the action of the cold blast of air we were enabled to melt 200 or 300 pounds of iron in about ten minutes, and the converter worked admirably throughout.

Molding and Handling of Product.

Let us now look at the question of the molding and handling of the steel. Owing to the extremely high temperature of the steel only the most refractory kinds of sand and clay are available, but, fortunately, they exist in such vast quantities in great purity that there is no difficulty in procuring them. As a matter of fact the difficulty lies in making a selection from the great number that are offered. Lime and magnesia are the two things to be above all avoided. The basis of the sand is practically pure silica, and a bond is given to it by the addition of a little silica fire clay. The molding is done exactly the same as in any other steel foundry, and the molds are either green sand, skin dried, or dry sand. The way a mold is made depends entirely on the nature of the pattern and the weight of the piece. Green sand is used whenever possible on account of speed and cheapness. Whenever possible molding machines are used, and it is probably in the class of work suitable for machine molding that the Tropenas process finds its best application.

The handling of the steel from the converter to the molds is done just as gray iron is taken from the cupola. A skimming device is placed in the mouth of the converter at the termination of the blow, and bull ladles or larger lip pouring ladles are used to take the steel away. The steel is hot enough to do this with ease, and it has the advantages of being able to see how much steel you have and you can pour just as fast or slow as you wish, and it is cheaper than bottom pouring.

Cost of Steel.

It is impossible to say what finished castings will cost. The total is made up of the cost of the steel in the ladles, plus the cost of molding and finishing and the fixed charges. The latter item depends on the skill of the molders, the class of work manufactured, and the local conditions make it necessary to figure any given case out separately. The cost of the steel in the ladles ready to pour is at the present time about 2 cents a pound for a small output of say 50 to 100 tons per month. With a larger output this

cost would be reduced. Foundrymen will be able to figure out what it would cost them in their own particular case.

Chemistry of the Process.

The chemical reaction taking place in all the steel making systems using acid lined furnaces is identical. It consists in removing by oxidation the bulk of the silicon, manganese and carbon from a bath of comparatively crude metal. The material may be melted in the furnace proper, as is the general open hearth practice, or it may be melted in some other way and introduced in a molten state into the furnace. In the open hearth furnace gas is used to supply the heat necessary to cause the reaction to take place. In the Bessemer or Tropenas process the metalloids in the bath itself are made to take the place of fuel, and by their combustion heat the bath to a very high temperature. The chief of these is silicon, every one per cent. of which consumed means a rise in temperature of about 500 degrees. The composition of the metal before blowing must be very carefully adjusted to get the best results, as upon this depends the length of the blow, the quality of the steel and the fluidity. The mixture is made up of pig iron and steel scrap from previous heats, and the best analysis to produce results is about silicon 1.9 to 2.3, manganese 0.6 to 1.0, carbon 3.0 to 3.5, and sulphur and phosphorus as low as possible. It has been claimed by some inventors that their furnaces will reduce phosphorus. This is not so, no silica lined converter being able to do this, as under the conditions that exist therein the phosphorus has a greater affinity for the iron than for anything else that is present and will not leave it.

Having seen what is the composition of the iron before blowing, let us see what is the action of the blast upon it. At the commencement of the blow sparks and smoke come out of the mouth of the converter, but very little flame. This is the silicon period, during which the silicon is raising the temperature of the bath to a point where the carbon will burn. After about five minutes the flame appears at the mouth of the converter. This is caused by the manganese commencing to burn and a little of the carbon. During this period the carbon which existed as graphite has become combined. If this flame does not make its appearance in five minutes or so it is an indication that the conditions are not right—either the silicon is too high, there is too much iron in the converter, or it is too cold. The operator may examine and find out what is the cause. If the flame appears too quickly the silicon is too low and the blow may be cold. The remedy is obvious. During the next six or seven minutes the manganese passes off rapidly, sometimes even causing the bath to appear to boil. After that the blow proceeds quietly, to end with an intensely brilliant carbon flame, which finally dies down, leaving a bath of practically pure iron in the converter. These indications are perfectly plain at the mouth of the converter, and the operator soon comes to understand them thoroughly. He can tell by the smoke, sparks and flame exactly what is going on inside.

Reference was made earlier to two rows of tuyeres. The action of the auxiliary tuyeres will now be explained. In all the converters using one row of tuyeres the carbon is only partially consumed and passes off at the mouth of the converter in the form of CO, carbon monoxide. This was found by an examination of the gases coming out of the converter. The introduction of a further supply of oxygen a few inches above the surface of the bath completes the combustion to CO_2, carbon dioxide, and the heat from this combution is reflected into the bath, increasing its temperature quite appreciably. The supplementary air is under complete control, as shown previously, and can be regulated to supply just the amount needed without any excess. It will therefore be seen that melting stock must be purchased under strict specifications as to sulphur and phosphorus, and each car must be checked over carefully.

The result of care in mixing and blowing will be to produce not only hot steel, but steel exactly suited to the purpose intended. It may vary in tensile strength exactly as required, from 50,000 pounds in the case of dead mild electrical steel to over 100,000 pounds in the case of high carbon steel.

The Tropenas Process as an Adjunct to an Open Hearth Plant.

Shipbuilders and engineers, who use large quantities of steel castings, varying in weight from many tons down to a few pounds, have no difficulty in getting the big pieces, and can get them quickly, but when it comes to small pieces, such as valve fittings, bearing caps, small gears and flanges, a very different state of affairs exists. The open hearth people take the big castings and tell the customer to send along the small patterns and they will run them in at about the same price. This is all very well as far as it goes, because if the small patterns are sent to a steel foundry specially laid out for the manufacture of small castings all sorts of fancy prices must be charged for them. The trouble is that having got the order the open hearth people go ahead and make the large castings, and the small ones are neglected for many months and even years; in fact they know perfectly well that in some cases they cannot make the castings at all. After many vexatious delays the patterns are recalled, and are made in brass or malleable iron or are sent to one of the small converter foundries to be made in steel. This is the end of the difficulty, for the Tropenas process makes steel to any specifications and can make deliveries as quickly as gray iron foundries.

It would seem, therefore, that the ideal arrangement from the open hearth point of view would be to put a Tropenas converter in a corner or side bay of the foundry. It takes up very little room and the economy of running it under such conditions cannot be approached in any other case. All the open hearth foundries have a cupola used for making flasks, &c. It is not used to its full capacity, and is probably quite suitable for melting the iron to be converted into steel in the Tropenas converter. Not more than two or three extra workmen would be needed to run it, and all that would be necessary by way of plant would be a converter and blower, at a cost of not more than $5000. The same molder would make the molds, the same gang pour the steel and its output would be entirely independent of the open hearth furnace. It can be shut down at a minute's notice and put in operation again in two or three hours at a cost of a very few dollars and about ½ ton of coke.

The special advantage of running the Tropenas system in connection with the open hearth is that from the general run of work there can be selected to be made by the Tropenas just that class of castings which are specially suited to its capabilities, and this includes all those which cannot be made by the other process. The Tropenas process remelts all its own scrap—that is to say, all the heads and gates from the castings—but sometimes these are too large to be melted in a cupola such as is used with the converter, and these could be turned over to the open hearth furnace. In this way we see that the most favorable conditions exist for the above combination. The open hearth foundries could then handle with ease anything that comes along, and give perfect satisfaction as to delivery.

Before closing I must say one word about the electrical qualities of steel manufactured by this process for that purpose. A specimen on the table will show by its fracture the crystallization of practically pure iron; it is in fact possible to describe it as cast wrought iron. This metal, possessing great permeability, is applicable in the construction of dynamo machinery and the hysteresis curve made by actual test shows that it exceeds open hearth steel and very nearly approaches Norway iron.

In conclusion I may say that all converter systems have been adversely criticised on account of giving a lower yield than the open hearth; that is to say, out of a given quantity of iron charged into the cupola there is something like 12 to 15 per cent. less returned as steel. When it is considered that this loss includes from 4 to 7 per cent., the normal loss in a cupola melting a considerable portion of steel scrap, and also about 6 per cent. of carbon, silicon and manganese which have taken the place of fuel and supplied all the heat necessary to raise the temperature about 1000 degrees in 25 minutes, it does not leave much to be counted as actual loss.

Labor News.

The Amalgamated Association has called off the strike at the plant of the McKeesport Tin Plate Company, at Port Vue, in McKeesport, Pa. The association has stopped paying strike benefits and has advised the men to go back to work. However, many former employees of this plant who went out on strike will not be able to get their positions back, as their places have been filled. The entire plant of the McKeesport Tin Plate Company is now in full operation and the firm have more applications for positions than can be filled.

At Pittsburgh, the officials of the Amalgamated Association gave out a statement regarding the convention last week at which was considered the question of removing the output in nonunion sheet mills. It was decided not to remove the limit, but a resolution was passed providing: "That a committee of 11 sheet mill men be appointed, consisting of two rollers, two heaters, two shearmen, one rougher, one catcher, one pair heater, one matcher and one doubler, to formulate a scale based on a tonnage system for all sheet mill men."

The third annual convention of the Blast Furnace Workers' and Smelters' Union of America, in session at Youngstown, Ohio, last week, adjourned on Friday, September 4. The convention will meet in St. Louis next year, and the old officers were re-elected, as follows: President, James McMahon, Struthers, Ohio; first vice-president, Charles E. Hardy, Hanging Rock, Ohio; second vice-president, Michael Morrissey, Herculaneum, Mo.; fourth vice-president, Peter Thorson, Riddlesburg, Pa.; secretary, W. J. Clark, Buffalo; treasurer, Michael Keenan, Buffalo; trustees: Charles Pritchard, Suwanee, Ohio; H. C. Hamburg, Ironton, Ohio. President McMahon was selected as the delegate of the organization at the American Federation of Labor convention in Boston next year. The eight-hour movement, which was much discussed, was left to the discretion of the National officers.

It is not improbable that T. J. Shaffer, president of the Amalgamated Association, may be asked to resign his position at an early date. Mr. Shaffer failed to be present at the meeting of delegates held in Pittsburgh last week, to take up the question of removing the limit for output in union sheet mills and also the declaring open of nonunion mills. There is a great deal of feeling among the members of the association against Mr. Shaffer, and many of them are in favor of asking him to retire. This feeling against him dates back to the summer of 1901, when the great strike took place in the tin plate and sheet mills operatel by the American Tin Plate Company, and which resulted in a disastrous defeat of the Amalgamated Association. The members believe that this strike was illy advised and it cost them a great many important plants where the Amalgamated scale was formerly signed and which are now nonunion.

The molders employed in the New Castle, Pa., district have been granted an increase of 10 per cent. in wages.

The iron workers employed by the H. B. Smith Company, Westfield, Mass., have asked for a 9-hour day with the present 10 hours' pay. The demand does not come from the Molders' Union, the molders employed by the company being on a schedule agreed upon by them which has some time yet to run under its terms. The demand, which is in the usual form, is from the Westfield branch of the Iron Workers' Association. It names September 1 as the date upon which they wished the change to go into effect, but nothing has been done either by the H. B. Smith Company or the workmen beyond the formal presentation of the demand.

The Bessemer Gas Engine Company, Grove City, Pa., have decided to run their foundry and shops nonunion. About a year ago the company recognized the union, but had an agreement that the company were to be permitted to arrange the number of hours required for a day's work. It seems that the union recently began to interfere in this matter, and the management closed the plant down and will not resume until they can be safe in operating nonunion.

PERSONAL.

Albert Ladd Colby, for the past ten years metellurgical engineer of the Bethlehem Steel Company, has accepted the position of assistant to the president of the Orford Copper Company, 74 Broadway, New York, who are one of the constituent companies of the International Nickel Company, who control the nickel output in the United States. Mr. Colby's duties will be chiefly in connection with the manufacture and applications of nickel steel.

L. W. Rawson of Worcester, Mass., has been made superintendent of the Washburn shops of the Worcester Polytechnic Institute. The Washburn shops will be under the general jurisdiction of Prof. W. W. Bird, the new head of the department of mechanical engineering of the Institute, but Mr. Rawson will have the active management of the shop department.

Thomas Morrison, formerly general superintendent of the Edgar Thomson Steel Works, at Bessemer, has been elected a director of the Diamond National Bank of Pittsburgh.

Iron and Industrial Stocks.

The feature of the week was the severe decline in the common stock of Colorado Fuel & Iron. It declined $7 per share on Friday, which was probably due to the virtual passing of the dividend on the preferred stock. The common had sold up to 47¾ on Thursday and declined to 40¼ on Friday, selling up to 43½ on Tuesday of the present week, and declining to 40¾ on Wednesday. The general list was somewhat stronger, Steel preferred selling up to 71¾ on Tuesday and the common up to 23⅜. Dominion Iron & Steel advanced from 9¼ on Thursday of last week to 14½ on Tuesday of the current week. Can preferred declined to 40 during the week, which is stated to be owing to sales by holders who were disappointed because the stock had not advanced after the recent declaration of the dividend. Other stocks showed but slight fluctuations.

At Pittsburgh last week George Westinghouse, president of the Westinghouse Air Brake Company, made the following statement: "The net earnings of the Westinghouse Air Brake Company for the year ended July 31, 1903, were the largest in the history of the company. The directors will meet next week, and declare the regular quarterly dividend of 2½ per cent. and an extra dividend of 3½ per cent." In connection with the foregoing the following table, showing the net earnings of Air Brake for each of the past ten years and the amount of cash disbursed in dividends will be interesting:

	Net earnings.	Dividends paid.
1893	$2,100,000	$2,000,000
1894	548,695	1,000,000
1895	1,437,576	1,000,000
1896	2,607,936	2,000,000
1897	1,820,527	1,750,000
1898	3,967,973	2,500,000
1899	3,642,241	2,750,000
1900	3,519,198	3,575,000
1901	2,981,341	2,798,227
1902	2,928,695	2,634,468

Dividends.—The regular dividend of $1 per share will be paid on the stock of the Cambria Iron Company October 1, as registered September 15. The books remain open.

International Silver Company have declared a quarterly dividend of 1 per cent. on the preferred stock, payable October 1. Books close September 16, and reopen October 2.

Susquehanna Iron Company.—The Susquehanna Iron Company, Catawissa, Pa., incorporated August 5 with a nominal capital stock of $200,000, will operate the Danville Blast Furnace, at Danville, Pa., in the manufacture of foundry irons and by-products. The company hold leases on a number of tracts of ore lands and limestone which they will develop as sources of supply, and the furnace will be started on a mixture of Lake and New Jersey ores. Plants will also be erected for the manufacture of slag cement and mineral wool. Having four operations to equip, the company inform us that they are in the market for a quantity of machinery, furnace repairs, &c. The stack has an annual capacity of 27,000 tons. H. R. von Dorster is interested.

HARDWARE.

THOSE who have not looked into the matter are probably unaware of the extent to which Hardware merchants are taking hold of lines which have not been regarded as in the Hardware field. This is a feature which has wide bearing on the future of the trade, and it is difficult to estimate at all confidently what the ultimate effect of the tendency and change will be. Regarded simply in its immediate and obvious aspects, without attempting to forecast the course of things in the trade at large, the taking up of new lines by a Hardware merchant is an evidence of enterprise on his part which deserves the heartiest commendation in these days, when enterprise is so essential to business success. It is a breaking away from former limitations and striking out in a new path. It is a practical recognition of the obligation according to the laws of business to extend one's trade. It is an effort on the part of the individual merchant to escape from the routine methods and traditional limitations which are the bane of those who are content to continue in well worn and narrow ruts. The addition of a new line, the making of a new departure in trade, is in itself the mark of enterprise and push. Whatever may be the result of the experiment, which will, of course, depend on circumstances, the spirit prompting the effort is commendable.

The effect of the effort upon the merchant himself is not to be overlooked. Enterprise in one direction is pretty sure to be accompanied by a general vigilance and vigor of administration in others. Alertness in one department makes itself felt in the whole establishment. Something new in business, as in thought and effort in almost every field of activity, has a stimulating influence. Cases are not rare in which a new department in connection with an established business has brought the infusion of new energy into all departments. The efforts necessarily made to command the attention of the public to the new line and to secure customers for it have a direct influence on trade in other branches. The publicity thus secured contributes directly to the growth of the business as a whole, and the new methods employed for the marketing of one line affect sales in all lines. While these considerations have weight, each merchant must of course determine for himself the advisability, all things taken into account, of extending the classes of goods carried by him in stock, and must decide the question in view of all the circumstances and opportunities. We submit, however, that in the present condition of things the probability is that alert and enterprising business management would in most Hardware stores call for a branching out in some direction.

Condition of Trade.

The summer, with its relaxing in the aggressive prosecution of business and the disturbance caused by the vacation period, being now a thing of the past, and the fall season open, there is an evident increase in zest in the conduct of business. Manufacturers are more systematically and vigorously attending to the securing and executing of orders. Their plants, after repairs, and probably with additions or improvements, are running regularly and for the most part under heavy pressure to produce goods which the market is calling for and expected to absorb in large quantities. Merchants in similar spirit, if they have not already done so, are getting things in readiness for the fall business, and each according to his measure of enterprise and ability taking hold of the active cultivation of his field, large or small. All classes in the trade are watching the crop reports and rumors with solicitude, but note with satisfaction that on the whole the indications point to a good yield and good prices, which will lay the basis for continued prosperous conditions. The shrinkage in values of financial securities is not regarded with as much apprehension as at one time, in view of the probability that, notwithstanding this somewhat unpleasant process of getting down to a reasonable level, commercial matters in general move along with large volume of business and less disturbance than was feared. The chief influence of this decline in securities is found in the spirit of conservatism which is prevalent in mercantile circles, so that there is little disposition to speculate in merchandise but merely to purchase what is plainly required for the business of the next few months. The jobbers, generally, are well supplied with goods, but their orders, as well as reports directly received from them, indicate that goods are moving out of their warehouses freely, and that replenishing orders in some lines are called for even now. Prices are for the most part well maintained, slight concessions being obtained in some lines which a few months ago were firmly held. Some kinds of goods, especially those near the raw material, have rather an unsettled feeling and tend toward lower prices. In view of all the circumstances, while the situation calls for prudence and conservatism, there is evidently an opportunity for manufacturers and merchants to prosecute their business in anticipation of a profitable and satisfactory season.

Chicago.

(*By Telegraph.*)

Interest of the local trade seems to be largely centered in the outlook for Steel Goods—that is, small Agricultural Implements, such as Hoes, Rakes, Forks and similar goods. A meeting of the association is said to have taken place last Friday, but thus far no decision has been reached in regard to prices for the ensuing season. A difference of opinion is said to exist among the various interests, but a settlement is expected within the next few days. The impression has been abroad among the trade that higher prices might prevail, as it is known that local jobbers who endeavored to place large contracts on the basis of last year's prices were refused. Agents representing manufacturers of Lawn Mowers have been taking considerable business recently for next season's delivery, and a few advance contracts even for Refrigerators are being considered, but this is exceptional. Representatives of manufacturers of Shelf Goods, such as Cupboard Catches, Sash Fasteners, Pulleys and similar goods, have taken new business since the opening of the month, and further contracts of moment have been placed for Strap and Tee Hinges and Wrought and Plated Butts, but manufacturers of these goods, especially Hinges, are said to be accumulating stock to some extent for the first time in a year or more. A better trade is reported in Door Hangers of various kinds, but the market is not especially strong. Manufacturers of Builders' Hardware continue to gather a fair amount of current business, and there are a number of desirable contracts still to be placed for fall delivery, but the outlook for this line for next year is less encouraging than for some time, and the jobbers especially are not buying for stock to any appreciable extent. Common goods are especially slow, while fine Hardware is well sustained. The Wire Nail mills report a continued active business, liberal specifications and considerable new business coming forward, the tonnage being purchased running slightly beyond the figures of a year ago. Jobbers report a fair volume of business, there being the usual increase experienced in September, and the prospects seem to be favorable for general trade of fair proportions. The demand for Wire and Nails is espe-

cially gratifying, and in fact nearly all Finished Wire products. The movement of seasonable goods, such as noted a week or two ago, continues to increase, mail orders during the past few days being especially heavy. There is a very good demand for Corn Knives, Corn Huskers and other implements for the harvesting of maize. The demand for Small Tools, especially Hatchets, Hammers and Axes, has increased, and there is still a fair movement in Scoops and fair sales of Shovels. Heavy goods have been rather slow, but manufacturers are specifying moderately on their contracts for Screws, Rivets, Bolts and similar goods, while jobbers are well supplied and are purchasing little of this material. The active demand for Lead and Spelter and the higher prices prevailing are probably responsible for the firmer tone for Galvanized Sheets, which are held a little stronger at the mills, but Black Sheets are still heavy and unsettled. Few if any important changes in prices of goods have come to the surface during the week aside from the advance in prices of Milk Cans. In general a better feeling is prevailing in jobbing circles, reports from the country encouraging the belief of a satisfactory trade during the next few months.

St. Louis.

(*By Telegraph.*)

The following observations on the condition of affairs in the Hardware market, from the standpoint of one of the most prominent jobbers, will be read with special interest at this time:

We read in the papers of only "fair" crops. We note the tremendous decline in securities in Wall Street. We hear the complaining of some of our business friends who have been filling the *rôle* of the "lamb." Some of our gray headed friends, who only go into Wall Street for cash on bargain day, have thought that bargain day had come; they have paid in their cash, but it seems there were still other and better bargain days. We read of the tight money market. We have trembled at the predictions of the great scarcity of money to move crops in the fall. We have listened to the predictions that something was wrong with one of the great moneyed institutions of New York, that the insiders knew all about this, and that some of these fine mornings when we took up our morning paper with our soft boiled eggs we would see an account of the collapse of this institution.

We have read in the trade papers that in prices the top has been reached, and that every conservative and careful business man would now "play close to his vest," or words to that effect. We have read of the great increase in the manufacturing capacity of the country. We have been told that the manufacturers were looking to foreign trade to care for their surplus when the domestic demand would show the terrible shrinkage that was coming. One of our prominent friends has told us that declines were "in the air," and that whenever declines got there they were soon sure to be a reality. One of our friends among the syndicate buyers told us that it would soon be a buyers' market, that sellers would soon sit in long rows on the benches waiting to be admitted into the inside office.

To all these things and more we have given an attentive ear. But our buyers report line after line of goods which, in the face of these stories, have been advancing in price. They report very few lines that have declined. A glance at our profits and losses from advances and declines for the past six months shows a heavy balance on the advance side of the column. The manufacturers of several important lines are still very slow in filling orders. Notwithstanding the usual dull summer period they have not caught up; the demand still seems to outstrip the supply. In reply to our importunities for goods and our inquiries why they cannot make enough they tell us of the scarcity of expert labor. Therefore our back order books are full and our correspondents write our customers of the conditions. When we gently and persuasively suggest concessions in prices we are confronted with figures showing the increased cost, not of material, but for labor and the other necessary expenses in manufacturing.

We find that the manufacturers with whom it has been customary to dictate the selling prices of jobbers are more insistent than ever that such prices should be maintained. We find other manufacturers, whose goods have been sold on the open market subject to the whim and caprice of every salesman, are leaning more than ever to the restricted price idea of selling goods. The "smart" retail merchant whose chief delight was to induce some ambitious salesman to give him a vest pocket rebate on combination goods is finding it more and more difficult to enjoy his favorite pastime.

Then the railroads—they tell us of traffic congestion, of the scarcity of cars; and after we have finally managed, by having our buyers make personal visits to the manufacturers, to get certain lines of goods, then we wait an indefinite length of time for these cars to be delivered. We trace by mail and we trace by wire. Still the days go by and the much wanted car does not put in its appearance. Our customers from the farming districts call on us, and having read the papers, we are prepared to sympathize with them on account of poor crops, but 99 out of 100 of these visiting customers report most satisfactory conditions. They report a good, steady retail trade, they buy liberally and do not seem to be seeking any sympathy. All they want is to have us ship their goods promptly and fill their orders complete. We talk to our salesmen, and they seem full of good cheer and confidence in the prospects for business in the last part of this year and next spring.

We refer to prices on those great staples—Nails and Wire. We find they have been well maintained. We have received no intimation from the manufacturers of a decline. Jobbers have used up their old contracts and are on the new basis, and if they wish to "get gay" in making prices they can do so at their own expense; in other words, do business on these goods for nothing.

We refer to the monthly statements of our business. We see satisfactory increases in every department. We are doing as much business as we can handle comfortably; more business would bring about a condition that would be unsatisfactory. Our pay roll is considerably higher than last year. We are paying quite a good deal more for labor than we have in the past. Good men have come to us and called our attention to the increased cost of rents, of supplies and of all the necessities of life. They have invited our attention to the fact that notwithstanding this increase their salaries have not been advanced. We have made advances. What else could be done? In studying our monthly balance sheets everything has been lovely, except the expense account. That is constantly creeping upward. It imposes upon us the necessity of getting a reasonable profit for our goods.

From our own experience we are led to believe that the daily press and the trade papers are inclined to overrate the possibilities of declines in prices. We believe crop conditions are better than they have been reported in papers. We were not surprised when it was suddenly found that the cotton crop promised much better than had been reported. When we come in contact with actual conditions, through our customers and salesmen, they seem to be very healthy. When we read the papers we are led to believe that things are going to the 'demnition bow wows." While our bankers have advanced their rates, we have never experienced any difficulty in getting all the money we needed for the legitimate requirements of our businss, nor have our bankers warned us that they could not take care of us in the future. Like everything else, the cost of money simply seems to have advanced, which of course adds to our expense account.

To sum up the situation, we do not expect to see any reduction in prices. We believe that there will be a satisfactory trade throughout the fall and spring. We also believe that jobbers are carefully considering their profits; they are studying the cost of doing business. A careful analysis of the cost of handling, warehousing and selling certain lines of goods has led to some surprising discoveries. A clear and definite idea of the cost of doing business is the great safeguard, in our opinion, of the present situation. In other words, the expense account of every intelligent manufacturer, jobber and retailer makes him conservative when questions arise that affect the reduction of the value of goods. We hear from one of our jobbers of the sales of six opening stocks in one

day in territory west and south, and one as far east as Pittsburgh.

NOTES ON PRICES.

Wire Nails.—A better demand is perceptible, indicating that merchants are having a more extended call for this line of goods. The mills experience no difficulty in making prompt shipments, as far as their stocks are concerned, which are sufficient for present requirements. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots	$2.00
Retailers, carload lots	2.05
Retailers, less than carload lots	2.15

New York.—Thus far during the month store trade for small lots has been good, coming largely from nearby points rather than from city merchants. Carload orders from points tributary to this city are also becoming more frequent. There is a general desire expressed for prompt shipments. The market is firm at the following quotations: Single carloads, $2.20; small lots from store, $2.25 to $2.30.

Chicago, by Telegraph.—Both new business and specifications on previous contracts are coming forward to an encouraging extent, and the market continues to rule firm as previously quoted, sales being made at $2.15 to $2.20 in carload lots, f.o.b. Chicago, the inside price to jobbers and the outside to retailers. Less than carload lots sell at 5 to 10 cents higher. For galvanizing 75 cents per keg and for tinning $1.50 extra per keg is charged.

St. Louis, by Telegraph.—Sales are in very good volume, and jobbers report satisfactory conditions. Carload lots sell at $2.25, and as high as $2.35 in smaller lots from store.

Pittsburgh.—Demand for Wire Nails is heavier now than for some time. Some good sized contracts have been placed, while specifications on old orders are coming in very freely. The mills anticipate a heavy fall demand, and are well prepared to take care of it, having good sized stocks on hand. The tone of the market is very firm, and it is believed present prices of Wire Nails will continue in force for some time. We quote $2 in carloads to jobbers, $2.05 in carloads to retailers, and $2.15 in small lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days. For galvanizing Nails 75 cents per keg is charged and for tinning Nails $1.50 per keg extra.

Cut Nails.—A fairly active demand rules, with sufficient stocks at mills to insure prompt shipment. Quotations are as follows: $2.15, base, in carloads, and $2.20 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

New York.—The Cut Nail demand is about in the usual proportion to that of Wire Nails. Prices are well maintained, and quotations for carloads and less than carloads are as follows: Carloads on dock, $2.29; less than carloads on dock, $2.33; small lots from store, $2.40.

Chicago, by Telegraph.—But little, if any, increase in the demand has been noted for Cut Nails, but there has been a moderate volume of business, mills shipping promptly on orders received on the basis of $2.30 in carload lots and $2.35 for less than carload lots for Steel, Chicago. Iron Nails are quiet, but the supply is only moderate and sales are made at $2.45 to $2.50 per keg from store.

St. Louis, by Telegraph.—The demand is said to be very fair, with jobbers' quotations unchanged on lots from store, as follows: Steel at $2.40 and Iron at $2.55.

Pittsburgh.—We note a fair demand for Cut Nails, which is showing betterment, and the mills anticipate a good fall business. The tone of the market is firm and we quote: Steel Cut Nails, $2.15, base, in carloads and $2.20 in less than carloads; Iron Cut Nails, $2.25, base, in carloads and $2.30 in less than carloads, plus freight in Tube Rate Book to point of destination, 60 days, less 2 per cent. off in 10 days.

Barb Wire.—There is a reported increase for delivery during the present month over that of August, with anticipations of a larger fall business. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots	$2.30	$2.60
Retailers, carload lots	2.35	2.65
Retailers, less than carload lots	2.45	2.75

Chicago, by Telegraph.—The volume of business has continued good, the aggregate tonnage of orders received still running slightly ahead of the corresponding time a year ago, and the outlook for continued liberal business is considered encouraging with a firm tone prevailing. Galvanized Wire is selling on the basis of $2.75 to $2.80 in carload lots, and Painted at $2.45 to $2.50, the outside price being to retailers. For small lots 5 to 10 cents extra is charged. Staples in carload lots sell as follows: Polished, $2.30 to $2.35, and Galvanized, $2.70 to $2.75, the outside price being to retailers.

St. Louis, by Telegraph.—Trade in this department shows advancement, and the expectations of a good fall demand will likely be realized. Jobbers quote in lots from store, Painted at $2.60 and Galvanized at $2.90.

Pittsburgh.—Demand for Barb Wire is fairly large from Western sections of the country, but in the East is rather quiet. The mills believe demand will be materially larger before long and have good sized stocks on hand, thus being able to fill orders promptly upon receipt. Prices are firm, but without change, and it is the impression that present prices will continue in force for the balance of this year. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days: Painted, $2.30; Galvanized, $2.60, in carloads to jobbers; Painted, $2.35; Galvanized, $2.65, in carloads to retailers; Painted, $2.45; Galvanized, $2.75, in small lots to retailers.

Smooth Fence Wire.—An improved outlook for the future is coupled with a fairly active demand at present. The mills are reported as having large stocks on hand, which will permit of their making prompt shipments on contracts. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads	$1.90
Retailers, carloads	1.95
Less than carloads	2.05

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12 & 12½	13	14	15	16
Annealed	Base.	$0.05	.10	.15	.25	.35	.45	.55
Galvanized	$0.30	.35	.40	.45	.55	.65	1.05	1.15

Chicago, by Telegraph.—The manufacturing trade, who have largely placed contracts, are now specifying liberally and the demand from jobbers is encouraging. There is quite a satisfactory movement and the market continues firm, sales being made at the following prices: Nos. 6 to 9, $2.05 to $2.10 in carload lots on track, and $2.15 to $2.20 in less than carload lots from store; Galvanized, 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 16.

St. Louis, by Telegraph.—The market continues firm and the general volume of demand shows improvement. Quotations are as follows: In lots from store, No. 9 at $2.30, and Galvanized at $2.60.

Pittsburgh.—Demand is heavier than for some time, being particularly large in the West. The mills are making regular shipments from stock and are able to fill orders very promptly. Prices are firm, but without change, and we quote: Plain Wire, $1.90, base, for Nos. 6 to 9 carloads to jobbers, $1.95 in carloads to retailers and $2.05 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 16.

Cordage.—The demand for Rope is well sustained, and quotations are fairly well adhered to. Quotations, on the basis of 7-16 inch diameter and larger, are as follows: Mixed Sisal, 8¼ to 8½ cents per pound; Pure Sisal, 9¼ to 9½ cents per pound; Manila, 11½ to 11¾ cents per pound.

Glass.—It is conceded by both manufacturers and jobbers that the Glass market is in an unsatisfactory condi-

tion. The demand is only for immediate requirements, and there is no prospect for any improvement in the near future. The market in an open one—at this point at least—for both buyer and seller. While discounts of 90 and 10 per cent. for small lots of the first three brackets, and 90 and 15 per cent for sizes above, are supposed to be the basis upon which sales are to be made, cash buyers succeed in obtaining better figures. As manufacturers are in need of money as well as jobbers, the latter usually can find some of the former who are willing to supply Glass so that the jobber can meet his customers' views as to price and yet make a slight profit. It is rumored that Glass manufacturers may not find it profitable to manufacture Glass at the increased wages, and that a general resumption may not be ordered until the workmen become enough dissatisfied with idleness to suggest lower wages. Three or four concerns outside the combines have begun making Glass, but their output will not be large enough to affect the market.

Oils.—*Linseed Oil.*—Quite an active demand has developed during the week for five and ten barrel lots. Large consumers who have contracts are sending in specifications on old orders. Buyers are not taking any interest in placing orders for future delivery at present prices, nor are crushers inclined to make contracts for future delivery beyond the present month. Quotations are as follows: City Raw, in lots of five barrels or more, 37 cents; in lots of less than five barrels, 38 cents per gallon. Out of town brands of Raw are quoted, according to quantity, at 35 to 37 cents per gallon.

Spirits Turpentine.—Advances in Savannah, attributed to speculative manipulations, were reflected at this point by a higher and fluctuating market. Under these conditions little business was done. The market here is dull and weak at the following quotations: Oil barrels, 59 to 59½ cents; machine made barrels, 59½ to 60 cents per gallon.

RIVERSIDE HARDWARE CABINETS.

AN illustrated catalogue, entitled "The Story of the Modern Hardware Store," issued by Farwell, Ozmun, Kirk & Co., St. Paul, Minn., shows a line of Hardware Cabinets manufactured by H. O. Amundson, Alexandria, Minn. The line thus shown consists of Cabinets, Open Cabinets, Bases, Shelving and Wall Show Cases. The Bases are subdivided into Bolt Bases, Nail Bins, open Bases, &c. They are made of quarter sawed oak, finished in natural color, thoroughly filled, rubbed and coated with Berry's white shellac varnish. The bottom and sides of the drawers in the Cabinets are of Old Process roofing tin, with oak front and basswood back. The pulls and label holders are bronze metal. Drawers in the Bases are of wood complete, partitioned for the articles desired. The handles are of oak, strong and neatly modeled. If one Cabinet or Base only is ordered it is furnished complete. If more than one, the moldings and beadings are continued so that they present one unbroken front. The Cabinets are carefully crated for shipment, so that the customer may receive them in perfect condition.

Baltimore Hardware Company, Baltimore, Md., have favored us with photograph of their well arranged store at the corner of Baltimore and Greene streets. This store is 22 x 100 feet, and was established in 1896 by B. F. Guildener, Sr., and B. F. Guildener, Jr. The firm state that they sample most of their goods and find it pays, remarking that lots of people come into a Hardware store and do not know just what they want until they see it. They use wooden boxes with a sample in front, the surplus stock being carried just above where the goods are sampled, so that the merchant may see at once when he is running out of goods. The firm take special pride in their show windows, and always have goods in them that are in season, and when they buy anything new they display it in the window. They remark that it surely pays to keep goods where people can see them.

DEATH OF L. E. HANSON.

LYSANDER E. HANSON, who for a number of years has represented the McKinney Mfg. Company, Allegheny, Pa., died at his residence in that city August 18. We give his portrait herewith. Mr. Hanson was born in Exeter, Me., on July 8, 1833, and spent his boyhood in Boston. Shortly before attaining his majority he entered the army, from which after three years' service he resigned to embark in business as secretary of the Wheeling Hinge Company. In 1881 he removed to Allegheny, Pa., and immediately identified himself with the McKinney

LYSANDER E. HANSON.

Mfg. Company, with which concern he was still connected at the time of his death. He leaves two daughters, both of whom were married. Mr. Hanson had a wide acquaintance among the trade, and his many friends will learn of his death with sincere regret.

AMONG THE HARDWARE TRADE.

The Kansas Hardware Company, consisting of M. S. Atwood, Frank Shungel and Claud Cross, have succeeded W. T. Branch at Beloit, Kans. The company will carry on a retail business, handling Shelf and Heavy Hardware, Stoves, Tinware and Sporting Goods.

The McGaughy Hardware Company of Pine Bluff, Ark., which was organized in 1897 with a capital of $10,000, have increased their stock to $50,000, owing to the increase in business. The company carry on a wholesale and retail business in Shelf and Heavy Hardware, Stoves, Tinware and Agricultural Implements.

J. E. Fossum has purchased the business of Christopherson & Fawcett of Mabel, Minn. Mr. Fossum will conduct a retail business in Shelf and Heavy Hardware, Bicycles, Sewing Machines, Cutlery, &c., and will also carry on a tinshop.

Alber & Seltz have purchased the stock of the Ansley Hardware Company of Galeton, Pa., and will continue the business. The members of the new firm are both experienced Hardwaremen, Henry T. Alger having formerly been of the firm of Weatherby & Alber, at Addison, N. Y., this partnership has been dissolved, Mr. Alber retiring. The other member of the new firm, Henry E. Seltz, was formerly head clerk of the Ansley Hardware Company, whom the new firm succeeds.

THE VITALITY AND GROWTH OF HARDWARE ASSOCIATIONS.

OUR editorial in a recent issue calling attention to the necessity of awakening and keeping alive throughout the year the interest of the membership of Hardware associations in the work of their associations has called out a number of letters from merchants connected with the movement. There is entire uniformity of opinion in regard to the desirability of some development in the working plans of retail Hardware associations with a view to keeping the membership in closer touch with what is going on and rendering the work of the associations more obviously useful to the merchants.

We give below extracts from several of these letters. While there is the general recognition of the need of new or at least additional methods, there is a good deal of perplexity in regard to the precise lines on which the work should be conducted. The letters which are given should be carefully considered by the trade. It is obviously necessary that there shall be a candid recognition of the difficulties before any adequate solution can be expected. It is a striking evidence of the strength and merit of the movement that in spite of its deficiencies it has awakened so general an interest and has brought together thousands of progressive Hardware merchants for consultation in regard to the means by which their interests and the interests of the trade may be conserved and promoted.

Discussion Invited.

In view of the practical importance of the subject we invite from the trade a discussion of the whole subject. This will properly include any criticisms on existing methods, suggestions in regard to improvements in such methods, or any considerations which should have weight with merchants, inducing them to give to the association work their countenance and support.

All the following letters are from merchants connected with the association movement to which they are loyally attached. Taking as they do practical views of the subject their suggestions deserve the best consideration:

THE IMPORTANCE OF SECURING A REPRESENTATIVE MEMBERSHIP.

From an Ohio Merchant: I have been greatly interested in the several articles in the recent issues of *The Iron Age* relating to the retail Hardware associations, and more especially to a later article regarding the perpetuity of this movement.

As one of the first who allied himself to a retail association, I must confess that at times during the past two years I have wondered whether this movement had not reached its fullest limit. Possibly I may be mistaken, and if I am, I am sure the friends of the association will be glad to know it. But what shall we say of the apathy of the average merchant? The indifference of the small dealer as well as the large retailer (who is too small to enter the jobbers' association and yet thinks he is too large to be classed as a retailer) has seemingly been a bar to the advancement that would have been made by all our associations.

Indifference of Merchants

For several years I had the honor to be an officer of one of the larger associations, and I must confess that I was somewhat disappointed, by the indifference of the merchants to this movement. As a rule the Hardware merchant in any city, large or small, is a citizen of more than ordinary intelligence. He is usually connected with its most important interests, both civic and commercial. Furthermore, he is rated in mercantile circles a trifle higher than his fellow merchants. Hence for this reason, and without disparaging other branches, a Hardware association should be an organization of dealers that should make an impression upon the business world. Now, while this is true, it is also true that the growth of the association has been very slow and, to some of us, quite disheartening. I must confess that I was somewhat mystified at the slow growth of our own association, and while we have gone far in advance of the others, yet we have not made the impression that we should have done. In our own State hardly one-third of the Hardware dealers have enrolled their names on our membership, and yet herculean efforts have been made by its officials for several years.

Where shall we seek the cause and then the remedy? Is it possible that one merchant does not have the time, that another cannot stand the expense, that our meetings are so poorly attended? And is it also possible that as merchants we are too busy to ally ourselves with an organization of this kind? I think I voice the opinion of my fellow merchants when I say that any of us have the time to spare and that the money expended is well invested.

But why the wholesale indifference? I confess to you I cannot answer this question. I would that some of your readers might.

Search for a Remedy

In your issue of August 27 you seek a remedy—that of creating interest in the months that intervene between the annual meetings. On this point I might say that a most excellent plan would be to mail quarterly to each member an account of the events that would be of interest that have transpired during the preceding months. But this would entail great labor on the part of the secretary, who is usually a busy merchant and does not have at his command the time nor the funds to disseminate such information. It is also possible that matters of interest to the members of the association have been extremely light and insignificant, and such information would hardly justify the labor and expense. I also noted your remarks regarding outings or sectional gatherings. In our own association this has been broached several times, but was found impracticable, inasmuch as almost every Hardwareman had his own particular resort, to which he and his family hied themselves in the summer season. But the burden of my message is not what shall we do to keep alive the association, but how to quicken those that are seemingly dead to the appeals of the membership committees. It goes without saying that unless we grow, we must fall; standing still means retrogression.

Increasing the Membership

Since *The Iron Age* has always given a great deal of its space to association work, I should like very much to see this question discussed in your columns. I am sure it would attract attention. Possibly a discussion on the growth of retail associations might be of great benefit to the associations that are now in existence and to others that are in embryo.

In looking over an account of the annual meeting of the Ohio Association for 1899, I notice that the secretary, closing his report, uses these words:

> Surely there must be something in an association of business men that should appeal to the dealers of Ohio who are not members. The discussion of trade topics, the interchange of ideas, coupled with an enlarged acquaintance and the fellowship that exists between our members—all these must in some degree tend to moderate the sharp competition that usually exists between dealers, and in its place beget a fraternal spirit that ought to prevail. . . . . If the Hardware dealers of our State could but know the value of an organization, which in its very nature is bound to be a guardian of their rights, they would quickly come forward and join us, thus protecting themselves and strengthening the association.

Now, in conclusion, let me say that although every Hardware dealer that has ever attended an association meeting will quickly agree with the secretary, yet I still press my query, why this seeming indifference on the part of the average merchant?

NECESSITY FOR A PAID SECRETARY.

From an Officer of the Iowa Association: This is a subject to which every officer of the different retail associations, if at all interested in association work, has given a great deal of thought.

To me the inability of the different associations to

keep up the interest in the work throughout the year has been the only great stumbling block in the way of securing new and retaining old members. One of the possible objects the Iowa Association had in mind when we organized our insurance feature was that we would give our members a direct financial return, having in mind that one of the best ways to interest the average man is through his pocketbook. We believe that this plan is going to be in a measure successful, but we feel that there is still something lacking.

Insurance Feature

I have always strongly advocated employing a permanent secretary with a salary. I believe that if this could be done by all the associations they would find in securing the right man that he would be able to devise ways and means, with the assistance of the Board of Directors and Executive Committee, of keeping up a comparative interest in the association work during the year. A secretary of this kind could devote his entire time and attention to the work. As it is now the secretaries are very largely active Hardware dealers and do not have the necessary time to devote to this work, and I am sure that the members would feel very much more disposed to take up the time of a paid secretary than a volunteer one.

Salaried Secretary

WORK BY THE MEMBERS IN BEHALF OF ASSOCIATION.

From a Merchant in Michigan: Your editorial of August 27 is very good, but in addition to it we want definite work laid out for us. In Michigan the membership has been increased 33 1-3 per cent. the last year. Our members were secured by personal solicitation. A recommendation adopted at our last annual meeting was that the State be divided into counties or districts for securing new members. To grow we must work all the year. At convention time alone does not do. In States having the insurance feature members are more easily secured, for they see the money coming back to them. We are not discouraged, but hopeful of the future and appreciate your efforts in our behalf.

Dividing Up the State

THE INSURANCE FEATURE AND GRIEVANCE COMMITTEE'S WORK.

From an Influential Member of the National Association: You touch on a subject that I have been thinking of a good deal. How to reach the merchant and to convince him that the Hardware associations are of practical value to him is the problem that must be solved if there is to be permanency in the organizations. We must, as organizations, be useful or useless. The effort on the part of the National Association to scatter knowledge through the quarterly bulletin is good as far as it does. But it does not cover the ground as thoroughly as we could wish. The insurance feature, both State and National, is of benefit, as it shows a possible return for the money invested in dues. Some men want to take back home from the annual conventions more than they brought. To satisfy that desire and make the men think that it has been a money maker for them to attend the conventions is another difficult problem. In our State we have more or less activity during the year. Our secretary aims to keep in touch with the members by sending them postal cards during the year, calling attention to meeting of the association and urging men who are not members to join forces with us. It is not enough to do, but it is as much as has heretofore been done. To accomplish greater results means either a larger membership or increase in the amount of dues. The last proposition is out of the question. So we turn all our energies to increasing the membership. Some of us look for larger things from the insurance annex to association work. I am not satisfied but what the hopes of the organizers of the scheme may be realized. When the report of the Insurance Board comes before the association next winter I think there will be large additions to the membership of the association, if the anticipations of the Insurance Board are realized. Then we have moved a step in advance.

Methods of Work

Insurance Feature

We are not having any complaints brought to the attention of our Grievance Committee. What the cause of this is I am not able to explain. It may be that we are all so busy that we do not notice the interferences. It may be that the experience the ——— Company had has made the jobbers more cautious in selling to consumers. And it may be that the conference held in Philadelphia has had something to do with the matter. For I am satisfied that the jobbers present at that conference have no sympathy with jobbers who wholesale to the retail trade and then try to retail to their customers.

Grievance Committee

I think, as you suggest, that there are a good many live questions that might with great profit be considered by the associations. But this work takes time, talent and energy to get it in shape to be considered by the members. But such work will have to be taken up as a part of the duties of the officers in the very near future if we expect the associations to grow and prosper. I am very glad that you are sounding the note for more energetic work.

Live Questions

THE ADVANTAGES OF ASSOCIATION MEETINGS, CORRECTION OF ABUSES, ETC.

From a Connecticut Merchant: You certainly are right in trying to interest the Hardware dealers in their association the year through as well as upon the dates of the annual meetings. You say "the movement is in such an interesting stage and has reached such a position of attainment and promise that questions concerning the lines on which it is to be directed deserve the best consideration of all broad minded and progressive Hardware merchants."

This certainly is true: Semisocial organizations are apt to leave all of the aggressive work to the officers, and the officers of an association are very likely to be busy men, and while they have the interests of their association at heart they may not be able to bring before the association all of the matters that should be placed there. The writer has tried to make it plain to the members of his association that it was not the object of this association to try to control retail prices, but to meet together to become better acquainted, to tell each other their grievances, and without doubt there will be ways devised to help us all. There are a great many matters that could be worked out by an association, or by some one representing an association, that would never receive any attention from an individual. I refer particularly to such questions as often arise—for instance, manufacturers quoting trade prices to consumers; jobbers doing the same thing, and many other like matters.

Members' Co-operation

The writer believes that the time will come when every State can afford to have an association, and that association employ a bright man whose duty it will be to take up every complaint that is brought to his attention in the name of his association; and the small salary paid to a man for doing this work would be money well spent, for there is no question but that a communication from him as representing all of the retail dealers in his State would receive courteous treatment. Some such method as this is the only way to remedy a great many evils. We can speak of them one to another and complain about them, but unless it is the business of some particular one to take it up it will go no further than talk.

A Paid Secretary

The Iron Age certainly has done a great deal to help organize the trade, and I only wish that every dealer would read and remember what you write in relation to this matter, and I believe that a short article every week on these lines will do much good. Long articles are not so easy to read, as it takes a few minutes of valuable time, but something short and to the point in an attractive place I think will educate the people, and will in time result in their taking an active interest in this matter 12 months in the year, for it certainly is of vital interest just at this time.

The Davis Hardware Company of Fort Scott, Kan., have been incorporated with a capital stock of $10,000, and will carry on a retail business in Shelf Hardware Stoves, Tinware, Sporting Goods and Cutlery.

TRADE CONDITIONS IN UTAH.

FROM A CORRESPONDENT IN SALT LAKE CITY.—Trade is quiet in all lines, though it will compare quite favorably with last year. Local labor troubles have had a depressing effect here as elsewhere, and much contemplated building has been delayed or abandoned, causing a corresponding decrease in demand for that class of Hardware. In the surrounding country merchants are buying as little as possible at present, as money will be scarce among the farmers until harvest time.

The prospect for fall business appears to be very fair. Crop indications are excellent, in fact, better than for some years, and in another month or two we expect business to improve greatly. The extension of the San Pedro Railroad to connect with Los Angeles is going to afford employment for a large number of men, and will also call for a large amount of construction material.

General prosperity still prevails, although money is certainly scarcer than last year, as indicated by the large decrease in bank clearings. We believe jobbers are placing quite heavy orders for fall and winter stock, and while we do not anticipate any great increase over last year trade ought to be very satisfactory.

REQUEST FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

REQUESTS *for catalogues, price-lists, quotations, &c., have been received from the following houses:*

FROM HACK-SANNER HARDWARE COMPANY, Shamokin, Pa.: This company, who are wholesale and retail dealers in Hardware and grocers' sundries, are preparing catalogues for their salesmen, in which they insert printed cuts of articles they are selling. They desire from manufacturers duplicate copies of pamphlets or circulars relating to novelties for the grocer, as well as goods for the general Hardware trade.

TRADE ITEMS.

THE Board of United States General Appraisers at New York, in connection with the matter of duty on Files, have recently considered the method of measurement. It appears that the Collector of Customs at Detroit, Mich., in deciding a question of duty took the entire length of the Files, including the tangs. The importer contended that the tangs of the Files, or the portions prepared for the reception of the handles, should have been omitted in measuring them, which, of course, would have reduced their length. The testimony taken at the hearing showed that in the trade the length of a File is estimated to include the distance from its heel, or part where the tang begins, to its point, the opposite end, and that the tang, which is uncut, and designed to be inserted in the handle, is not ordinarily included in the measurement. The practice at the port of New York is to exclude the tang in making such measurements.

ANOTHER step in the formation of the combination of Toy factories is the filing of a mortgage for $1,250,000 given by the National Novelty Corporation to the North American Trust Company of New York, to secure an issue of $1,250,000 of first mortgage, 6 per cent., 30 years' gold bonds, authorized for the purpose of developing and extending the business. The mortgage covers all the property owned by the National Novelty Corporation and all property which the company may acquire in the future.

E. M. Austin of Litchfield, Ill., has added furniture to his form line of Hardware, Paints, Oils, Varnishes, Tools, Cutlery, Vehicles, Harness, Baby Carriages, House Furnishing Goods, &c.

CONTENTS.

	Page.
A Model Bridge and Construction Shop.I. Illustrated	1
Manufacture of Sound Castings by Means of Thermit	8
Pacific Coast News	10
The Dorr Fuel Process	10
The Dominion Iron & Steel Company's Affairs	10
The Philadelphia Foundrymen's Association	11
The Bickford Double Tool Holder. Illustrated	11
Colorado Fuel & Iron Company	11
Wrought Pipe	12
The Erie's Industrial Department	13
The Pennsylvania Coal & Coke Company	13
Pittsburgh Manufacturers at St. Louis Exposition	13
Production of Coke in 1902	14
The Mullins Guard for Squaring Shears. Illustrated	15
Notes from Great Britain	16
Development of Indiana Water Power	17
The Australian Transcontinental Railroad	17
Lake Iron Ore Matters	18
New Automatic Cement Testing Machine. Illustrated	19
The History of Babbitt Metal	19
Canadian Notes	20
Massachusetts Corporation Laws	21
The New England Foundrymen	21
The Ft. Wayne Iron & Steel Company's Works	21
A New Furnace Gas Reversing Valve. Illustrated	22
Emery Wheel Practice in Foundries	24
The Schoen Car Wheel Company	25
Editorial:	
Disproportion of Gross and Net Railroad Earnings	26
British Views of the Cunard Subsidy	27
Restrictions on Foreign Corporations	28
Correspondence	29
The Pennsylvania Railroad Company's Great Coal Interests	29
The Chicago Pneumatic Tool Company	30
The Great Northern Coal & Coke Company	30
Obituary	30
Pig Iron Production Increased	31
Manufacturing:	
Iron and Steel	32
General Machinery	32
Power Plant Equipment	33
Foundries	33
Fires	33
Hardware	33
Miscellaneous	33
The Great Lakes International Commission	34
The Iron and Metal Trades:	
A Comparison of Prices	35
Chicago	35
Philadelphia	37
Birmingham	38
Pittsburgh	38
St. Louis	39
Cleveland	40
Cincinnati	40
German Iron Market	40
Trade Publications	41
The New York Machinery Market	42
New York	43
Metal Market	43
The Small Converter Process for the Manufacture of Steel Castings	44
Labor News	47
Personal	47
Iron and Industrial Stocks	47
Susquehanna Iron Company	47
Hardware:	
Condition of Trade	48
Notes on Prices	50
Riverside Hardware Cabinets	51
Death of L. E. Hanson. Portrait	51
Among the Hardware Trade	51
The Vitality and Growth of Hardware Associations	52
Trade Conditions in Utah	54
Request for Catalogues, &c	54
Trade Items	54
British Letter	55
Australian Letter	56
Electrical Goods in Hardware Stores	57
Belding in Verse	57
Price-Lists, Circulars, &c	57
Tack Interests at Taunton	58
Ammunition in Fires	58
Miscellaneous Note:	
Plain Back Molders' Shovels	58
Twentieth Century Encircling Clamp. Illustrated	58
The Wilcox Flexible Steel Roller Bearing Barn Door Hanger. Illustrated	59
Rummel Rain Water Filter. Illustrated	59
The Mack Washer. Illustrated	60
The Kohler Steel Shovels. Illustrated	60
All Clamp Ladies' Gem Skate. Illustrated	60
Marlin Combination Rifle Receiver Sight. Illustrated	60
Current Hardware Prices	61
Current Metal Prices	68

BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE, NORFOLK ST., LONDON, W. C., Aug. 29, 1903.

The Week's Hardware Trade.

THE recovery of the Hardware trade after the holidays is but slow, even if it can be called recovery. New orders in most branches are very scarce, and what there are are keenly competed for. Old orders are fast running out, and manufacturers are not happy over the prospect. The unseasonable weather we have recently experienced has much to answer for, leading to a pronounced shrinkage of demand on home account. The heavy and long continued rains have hurt the fruit crops, and the want of sunshine for hay making and the ripening of the corn has caused depression in the agricultural districts. This has meant a distinct weakening in the demand for the requisite tools. The rising tendency in the price of provisions, especially of bread, sugar and bacon, restricts buying, more particularly in ornamental goods. This restriction is acutely felt in Hardware and ironmongery establishments. Most of the orders now arriving are for Heating, Lighting and Cooking Appliances. Chandeliers and Gas, Water and Electric Fittings, Stove Grates, Ranges and Hot Water Apparatus are in request. The turnover in Cabinet and Plumbers' Brass Foundry, Cocks, Taps, Hinges, Hydrants, Flushing Cisterns, Door and Window Furniture is up to average. Builders' Hardware and Shop and Office Fittings are selling in some quantities. Ship, Cycle and Carriage Lamps and Stable Lanterns are also in some request, but the better descriptions of domestic Oil Lamps are hardly selling at all. Makers of electro plate and Britannia metal ware state that there is a slightly improving demand for Tea and Coffee Sets, Cruets, Biscuit Boxes, Spoons and Forks, and the makers of artistic pewter ware are busy. The Midland enamelers are capturing some of the German trade. It is more correct to say recapturing, since this business was once before in their hands. Makers of enameled plates for advertising are busy, and high priced Locks are selling well, but the commoner kinds are quiet on home account. With the exceptions above noted trade is distinctly dull.

Manufacturers of Spades, Shovels and other Mining and Excavating Tools, as well as of Joiners' and Engineers' Tools, complain that business is very quiet; quieter than some of them have known for years. A serious question with the makers of Spades and so forth is the growing scerceness and dearness of Handles. They are at least 1 shilling per dozen dearer than they were a year ago, and prices are stiffening. There is a suspicion that the supplying of Handles has got into the hands of a trust, who are controlling the market. There is a very quiet demand for all classes of Edge Tools, and work is by no means as plentiful as formerly. This is partly owing to the fact that at many places machinery is doing work that formerly was entirely performed by hand, which it was believed never could be otherwise done. When trade is, therefore, in a normal state, fewer workmen in certain departments will be required.

On overseas account fewer orders are coming from South Africa, but heavier indents have reached us this week from South America. A fair weight of goods is going to China. On export account Tubes are selling, particularly wrought iron seamless steel and the soldered brass varieties.

Polish Trade and How to Get It.

The future prospects of trade in Warsaw in particular and Poland in general depend almost entirely on the result of the negotiations between Germany and Russia respecting the new customs tariff. The new tariff proposed by Russia and published a few weeks ago is even more protectionist than that now in force, its main object being to protect those new branches of industry which cannot get a firm footing in the country on account of foreign competition, and also to render possible the production in Russia of various articles which have until now been entirely imported, as the duty on the imported articles was low enough to enable them to be sold at a price at which it would be impossible to produce them in the country. In one line after another, first a prohibitive duty is placed on the manufactured article, then, when the industry is firmly established in the country, on the machines that make it, and, if the raw material be produced in the country, on that also, until the only article on the market is that which is manufactured in the country on machines of Russian make of materials of Russian origin. The only thing for foreigners to do to make money in Russia is, therefore, to start factories of different kinds, as has already been done by some British and many German and other foreign firms.

Although this is perhaps a little disheartening, it must be remembered that there are openings for trade, most of which will be seized by Germany on account of her propinquity and consequent lower freight. If, however, navigation on the Vistula, with which question the Minister of Ways and Communications is at this moment engaged, be improved other countries will gain vastly, particularly Great Britain and America, as it will be possible to bring goods from Great Britain to Warsaw by water with only one transshipment at Dantzig, and in a reasonable time. At present the Russian portion of the river is so badly regulated, and the transport of goods in consequence so long and uncertain, that they are almost invariably brought by rail from Dantzig, thus adding greatly to the cost.

AGRICULTURAL MACHINERY.—Although the last two years were very hard for farmers in this district, the demand for Agricultural Machinery is steadily increasing on account of: (1) the ever growing necessity for more intense cultivation of the soil; (2) the scarcity of hand labor, which is likely to be greater than ever this year, and is caused by the temporary emigration of the peasants for the harvest season to Germany, where they get higher wages; and (3) the constant dividing up of large estates into small lots which are purchased by peasants with the aid of the State Peasant Bank, and which diminishes the available number of working hands for the larger estates and increases at the same time the number of small landowners who need some Agricultural Machinery. America and Germany are continually increasing their exports of Agricultural Machinery into this district. They began by making a careful study of local requirements and by adapting their machinery to them. American and German manufacturers build lighter and consequently cheaper machinery than do their British competitors. Lower prices are appreciated by every buyer, and lighter weight means less duty, cheaper railway freight and easier transport on the very bad local roads, and, most important of all, easier working by the small, weedy local horses. By these means and by their pushing methods of business, Americans and Germans have got hold of the bulk of the trade. For Germans it is easy, being so close, to send their representatives at frequent intervals; but the Americans also, although so far distant, make free use of this excellent means of keeping in constant touch with the buyer and conversant with his wishes and requirements. Both American and German manufacturers are ever ready to make any change to adapt their machines better to local conditions, and to grant longer credit and easier conditions of payment to the buyer. The principal American manufacturers of Harvesting Machinery have established at various centers their own branches and warehouses, where they store a sufficient quantity of machines and spare parts, &c., for repairs, so as to be able immediately to meet every demand for them. Where they have no branch houses they have an agent whom they supply with sufficient quantity of machinery which, if unsold in the first year, is carried over to the next year's account. The following shows the different kinds of Agricultural Machines as imported from different countries:

PLOWS.—The home industry in Plows is rapidly developing; those imported are chiefly of German make. British Plows are too expensive and not adapted to local requirements.

CULTIVATORS.—Cultivators are imported from America, Canada and Great Britain. The Germans are making strong attempts to enter the market.

HARROWS.—Harrows, especially spring tooth, are supplied in enormous quantities by the American manufacturers, and no other country even tries to compete.

SEEDERS.—The market for Seeders belonged hitherto exclusively to German manufacturers, but big American firms are beginning gradually to get hold of it. They spare no cost or pains to build drills better adapted to this country than the German drills.

WEEDERS AND HOES.—Weeders and Hoes are made by native manufacturers.

HARVESTING MACHINERY.—The Sale of Harvesting Machinery is rapidly increasing every year and lies entirely in the hands of big American manufacturers.

POTATO DIGGERS.—Potato Diggers, although not yet perfect, come from Germany; the Americans are, however, making strong attempts to build a better and cheaper Digger.

PORTABLE ENGINES, THRESHING MACHINES.—The market for Portable Engines (Threshing Machines), which was until now held entirely by British manufacturers, begins to be seriously threatened by German manufacturers, who introduce in their machines all the latest improvements, such as removable tubular systems of boilers, superheaters of steam, &c. The prices are

cheaper and they grant their buyers easy payment extending over three or four years.

OIL ENGINES.—The bulk of trade in Oil Engines belongs to Germans, British Oil Engines, although excellent, being generally too expensive.

CLOVER HULLERS.—Clover Hullers are almost exclusively imported from America.

WIND MILLS.—Wind Mills do not sell much in Poland, but what are sold come from America.

HORSE GEARS.—Horse Gears are manufactured in the country. Such heavy machinery could not stand the high duty and freight expenses.

GRAIN CLEANING MACHINERY.—Grain cleaning and dressing machinery is chiefly imported from Germany and Austria-Hungary.

CHAFF CUTTERS.—Chaff Cutters and Root Pulpers are imported in big quantities from Great Britain.

STEAM COOKERS.—Steam Cookers are suppiied exclusively by German manufacturers.

GRINDING MILLS.—Grinding Mills come from Germany and Great Britain.

HAY PRESSES.—Hay Presses come from Germany and America.

PUMPS.—Pumps and small Fire Engines are supplied in good qualities by the native manufacturers, though American Pumps which are cheaper, find ready sale.

DAIRY MACHINERY AND SUPPLIES.—Dairy Machinery and supplies are imported from Denmark and Sweden. Butter Churns and milk cans also in large quantities from Germany.

HAY FORKS AND GARDEN TOOLS.—Hay Forks and Garden Tools of American origin are considered in Poland to be the best.

Mistakes and Their Moral.

There was a time, not so very long ago, when Great Britain held most of this trade. The mistakes the British traders made may be thus summarized:

1. In neglecting this growing market and letting the trade drift into other hands, because at this moment more profitable business is to be done with other parts of the world.

2. The employment of foreign middlemen, to whom they give the monopoly of the sale of their produce on the Continent.

3. Insufficient inquiry as to the standing and credit of local firms before opening up business with them. Such information can be safely obtained from local banks or from one of the local or well-known Berlin inquiry agencies.

4. The exaction of too stringent terms, once they are satisfied as to the firm with whom they deal, and failure to adopt terms of payment and delivery, as accepted in the country, both with respect to agents and customers.

5. Want of study of local market and consequent adaptability of goods to local buying power, taste and requirements.

6. Insufficient or bad choice of local agents and failure to send out travelers or representatives of firm at frequent intervals as well.

7. Providing only goods that are of unnecessary high quality and consequently too dear.

8. Badly drawn up price-lists and insufficient advertisement.

Americans have now reorganized their consulate at Warsaw for the special encouragement of American trade, and are doing all they can to push trade. The United States have an advantage over Great Britain in retail trade in having a money order service with Russia, as well as a much simpler system of parcel post, which makes it easier to order and pay for small articles, which there is no means of doing in the United Kingdom. One sends a postal order and the goods arrive by parcel post. Americans are also particularly successful in securing the best services of the best agents. An agent naturally gives his best energies to the employer who treats him best. Here is an instance. The Americans say, "Pay us in the autumn for what you sell in the spring, and let what you don't sell stand over till next year on our account." The combination which has just been formed of the four largest American Seeding Machine makers, who declare their intention of making a specialty of foreign trade, will enable them still further to lower prices and extend credits and obtain a practical monopoly of the supply of these machines in this country. Foreign engineers in factories seem very successful in obtaining orders for their own countrymen. A point in which foreigners appear to be longer sighted than the British is in accepting small orders, with a view to getting bigger orders later on.

AUSTRALIAN LETTER.

MELBOURNE, August 10, 1903.

THE commercial tendency of the past month has been slightly an upward one. Country traders are not yet restocking 1 pennyworth more than can be helped, but one and all are hopeful of a fairly good season. Yet our climate is so peculiarly liable to sudden and severe changes that our farmers can never have any reasonable certainty of a good season until the wheat is actually bagged. The sheaving season is at hand, and supplies are beginning to be asked for. Wire Netting, Barbed Wire and Fencing Wire are moving freely. Heavy Hardware is dull, and Mining and Farm Implements and requirements are still depressed. The Melbourne annual agricultural show will have come and gone before this appears in print, and Implement makers will doubtless experience a small spurt in consequence.

The most engrossing topic of the month, commercially, has been the retirement from the Federal Ministry of the Minister for Customs, the Hon. C. C. Kingston. His rule was fraught with trouble to importers, who have been indiscriminately haled before the police court for errors in invoicing. He undoubtedly exposed some glaring swindling. Although his rule was severe, no one would accuse him of not being just. Perhaps the best idea can be formed of him from the expression of a subordinate, that "Kingston was a hard man to get on with, but it is harder to get on without him."

McLean Bros. & Rigg closed up their Hardware warehouse on August 1, and their West Australian stock has just been sold to a Mr. Vincent, in that State, for a sum approximating £70,000.

Briscoe & Co. are commencing operations in connection with their new warehouse in Lit. Collins street, Melbourne. This is to be built on American lines, as previously advised, and the architect and one of the firm have recently been in New York acquiring ideas.

An Interstate Conference of the various Chambers of Manufacturers commences in Melbourne this day. The subjects for consideration are the Industrial Conciliation and Arbitration bill, Preferential Trade within the Empire, Immigration Restriction act, Customs Administration, &c.

The figures of the Government statist showing the extent of our factories, &c., on December 31, 1902, will be of interest. In the manufacture of metals and minerals in the State of Victoria, there are employed 8476 persons in 504 establishments, while ammunition and explosives employ 133 hands in five establishments.

Newcastle, N. S. W., has started work on its sewerage scheme, referred to in these pages some time ago. This will mean a fair demand in plumbing and engineering requisites of all kinds for some time to come. A new dock, 450 feet in length, and with provision for extension, is also to be built shortly, at a cost of about £200,000. The usual adjuncts in the way of cranes, pumping machinery, &c., will shortly be open for tender, and American makers will please note. Business in Newcastle is fairly good, and the building trade has been quite active of late.

Customs.

The *Commonwealth Gazette* lists further tariff decisions as follows:

	Per c't.
Beds and Punches for cutting teeth in Saws	20
Bicycles, Tricycles and parts thereof—viz., rims, not plated or enameled, but permanently joined	20
Blowers (small) for forges, boilers and pneumatic tubes	12½
Irons (smoothing), with heater; Irons, free, heater	20
Knife and Scissor Grinder	12½
Lamp (apparatus for), used in supplying gas from kerosene—viz., cistern, cylinder, tank (automatic)	20
Axle Setters and Straighteners, Duplex Folding and Seaming Machines for making canisters, Valves, Patent Fuel Economizers (for heating water prior to injecting into boilers)	12½
Strainers for wire fencing	20
Cast Iron Chilled Wheels for coal or shale trucks and wagons	20

G. C. Foster has purchased the Hardware and Agricultural Implement business of J. H. Simmons in Edmond, O. T.

ELECTRICAL GOODS IN HARDWARE STORES.

DURING the past two years no small number of Hardware dealers have taken up the sale of Electrical Goods. The line has been found profitable, and because most Electrical Goods are metal goods, it seems very proper that they should be handled in the Hardware or metal store. Another strong argument in favor of these goods as a business maker is the fact that the sales are constantly increasing, that the business is continually growing, and yet there is much now in Electrical Goods that is as staple as Wire Nails, but more profitable.

The margin of profit is good, especially on the smaller articles, such as Bells, Fans, Motors and Novelties, which are purchased by the consumer and usually sold for cash.

In large manufacturing centers the Hardware dealer who is now selling mill and shop supplies will find a growing demand from his regular customers for much in the electrical line, as many mills are adopting electric motor power and electrical transmission in place of pulleys and belts.

In many of the large towns and cities Electrical Goods are being handled by small dealers, who perhaps having been small contractors have become dealers in these goods. In some cases these little dealers are unable to take care of all the business, simply because they lack the capital to carry sufficient stock.

The opportunity for the Hardwareman in many towns and cities is very great. He has an established place of business, probably well located in the business center; many of his regular customers use more or less goods in the electrical line, and with a comparatively small investment it is possible to get started in this branch of business.

Those progressive Hardwaremen who have taken up the sale of Electrical Goods have found the line profitable. The experience of one such dealer may be of interest and value to other retailers.

A merchant who conducts two retail Hardware stores in an important Eastern city finds at the present time about one-fifth of his business is in Electrical Goods. When asked by your correspondent what his experience had been in this line he said: "The profits are about the same as in Tools. When trade is once established Electrical Goods move rapidly—this is especially true of Batteries and small supplies. In almost every house there is something in the electrical line needed now and then. When the regular customers of the store know that they are able to procure these goods there the trade will come of itself."

It is usually best for the small dealer when starting in the line to buy from the jobber, as the manufacturers sell in small lots at rather higher prices than the jobber will quote. And to take advantage of the manufacturers' quantity price the dealer in starting in the line would be very apt to overstock. Much valuable information can also be given by the jobber as to best selling articles, &c.

After looking over the field, if the Hardwareman finds that there is a chance in this line to increase his business, it would be well to put in a small line at once, before some other store takes up the sale of Electrical Goods.

In adding any new line to the Hardware stock it is well to remember that the new line must be prominently displayed, well advertised and sold at as low prices as other stores sell the same goods.

John M. Killin & Co., Pueblo, Col., who carry a large stock of General Hardware, making a specialty of Guns, Ammunition and Shelf and Heavy Goods, have recently doubled their warehouse capacity by the construction of a very substantial brick building, located near the tracks of the Denver & Rio Grande and Santa Fé, giving them excellent shipping facilities. This house are making a strong bid for outside trade, and report very satisfactory results from their traveling men in Colorado and New Mexico. The firm were established in 1881, and their active head is John M. Killin, who is a well-known and enterprising merchant. Mr. Killin is a great believer in advertising, and the title of the firm is forcibly impressed on the public through the medium of steel enameled signs advertising the business, which appear on the steps of every trolley car in the city. The firm make it a practice not to sell over the head of the dealer, and when an order comes direct from a consumer the dealer gets credit for the sale and memorandum showing the transaction is immediately sent him.

BELDING IN VERSE.

"AN ODE TO BELDING" is a book of 32 pages, a souvenir of Belding, Mich., devoted to its leading business houses. On each page are two columns of verse, interspersed with illustrations of manufacturing plants, business houses, hotels, banks, &c. Interest is naturally centered upon the Hardwar econcerns whose virtues and stocks are extolled in the book. An illustration is given of the double "Yellow Front" store of T. Frank Ireland, regarding whom the poet writes, in part, as follows:

It was in the month of January in eighteen eighty-nine,
That Mr. T. Frank Ireland first opened up his line,
To give to Belding people and those for miles around,
As good a stock of Hardware as ever could be found.
His was a small beginning, but he kept upon his way,
Until the massive "Yellow Front" is with us here to-day;
And with an eye to business, a faithful watch they keep,
And use as a fit watchword these words, "We Never Sleep."
And within these walls are stationed a great and massive stock,
That is offered to their patrons at prices down to rock.

* * * * * * * *

Mr. Ireland courts your custom with ever open latch,
And gives you prompt delivery with neatness and dispatch;
And with the best of service, you surely must explore
The large stock of Hardware goods at T. Frank Ireland's store.

Another of the enterprising townsmen of whom the poet sings is O. J. Kuhn, a picture of whose Hardware store heads six verses, the first and last of which are here given:

There's a truth in the expression
That the dollars make the man,
And the knack of saving money
Seems about the proper plan;
And in life's continuous hustle
Persons cannot learn too soon,
And the problem's easily solved
At the store of O. J. Kuhn.

* * * * * * *

He has Guns and Ammunition,
And Fishing Tackle, too,
And Sporting Goods of all kinds
Stand out before your view.
He will tend to your repairing,
And you cannot go too soon,
If you wish to save some money,
At the store of O. J. Kuhn.

The scheme of the book is unique, and a wide distribution of the publication is calculated to bring Belding and its merchants into still greater prominence.

PRICE-LISTS, CIRCULARS, &c.

THE SAMUEL WINSLOW SKATE MFG. COMPANY, Worcester, Mass.: Illustrated catalogue relating to the company's line of Ice Skates for the season 1903. These include Club, Club Rink, Speed and Hockey Skates; Wood Top Rockers and Skates, Double Runner Skates, Skate Sharpener, Ankle Brace, &c.

THE BUHL MALLEABLE COMPANY, Detroit, Mich.: Circulars illustrating B. & J. Malleable Shovel D's and Malleable Conveying Chain and Wheels.

THE LISK MFG. COMPANY, Canandaigua, N. Y.: Illustrated catalogue of Lisk's Four Coated Enameled Steel Ware, and New Gray Imperial Ware. These goods are shown with white interiors and different colored exteriors. Every article is sent out with the manufacturers' unqualified guarantee.

THE VEHICLE APRON & HOOD COMPANY, Columbus, Ohio: Illustrated catalogue and price-list of Storm Fronts, Dust Hoods, Aprons for Buggies and Landaus, Kitchen and Wash Aprons, Rubber Gloves, Horse Covers, Curtain Lights, &c.

THE CHICAGO EYE SHIELD COMPANY, 112 Randolph street, Chicago, Ill.: Illustrated circular of Eye Shields, Protectors and Shades of Celluloid and Wire Gauze.

TACK INTERESTS AT TAUNTON.

A SYNDICATE, headed by Dr. B. L. Dwinnell, H. H. Shumway, C. V. Sanders and E. W. Sturgiss, propose to establish a new Tack business at Taunton, in one of the buildings formerly occupied by the large A. Field & Sons business, which was absorbed some years ago in the formation of the Atlas Tack Company. That company abandoned three factories in Taunton when the new plant at Fairhaven, Mass., was built, and these three properties, together with other abandoned factories, at Plymouth, Duxbury and Fairhaven, were recently sold at auction under trustees' sale, to satisfy a mortgage given to secure an issue of bonds. The Taunton syndicate bid in the properties in their city, together with enough of the Tack machinery to make possible the starting of a new Tack concern without the necessity of purchasing a great amount of machinery. The syndicate is not yet ready to announce definite plans of the business.

The impression has gone abroad through the press dispatches that the new plant of the Atlas Tack Company at Fairhaven was included in the recent sale. This plant is the property of H. H. Rogers of the Standard Oil Company, and will be continued by the Atlas Company as formerly, not being concerned in the issue of mortgage bonds under which the foreclosed mortgage was made.

The Taunton syndicate paid $8900 for the A. Field & Sons large brick mill on Spring street, Taunton; $4275 for the No. 2 Field mill and $4000 for the Taunton Tack Company factory, off Weir street. The machinery and other personal property in these plants brought $19,000. T. Wolfson of 11 Broadway, New York, bought the American Tack Company's factory and wharf properties at Fairhaven for $6950 and $3420 respectively. The machinery in this Fairhaven plant brought about $2000. The Loring & Parks plant at Plymouth sold to William J. Dunn of Fall River, Mass., for $2925. He has since disposed of this property to James W. Seaver & Co. of Cambridge, Mass., who will occupy it with their Paint manufacturing business. Mr. Dunn also bought the Duxbury property, known as the Island Plant, for $151.

A syndicate of Taunton men are also to erect a large manufacturing building at Taunton with a view to furthering the manufacturing interests of the city. The building will be one story and 200 x 400 feet on the ground. A power plant will provide power for the tenants, of which there will probably be but two, the new Lincoln-Williams Twist Drill Company and the Foss Valve & Specialty Company, which latter company are about to remove from Brockton to Taunton.

AMMUNITION IN FIRES.

THE WINCHESTER REPEATING ARMS COMPANY of New Haven, Conn., have made tests of Ammunition in wooden cases for the Municipal Explosives Commission of New York City, the purpose being to ascertain what danger, if any, exists where fire has attacked a building in which Ammunition is stored. The results are of especial interest to Hardware dealers, because many of them carry Ammunition in stock. While the commission has not as yet published their report on the tests, it is certain that no damage was done while large quantities of Ammunition were burning, although the spectators were in close proximity to what at first was thought would seem an exceedingly dangerous blaze, but which proved to be as harmless as so much burning excelsior. There were burned in this blaze:

1000 cartridges, .45-70.
10,000 cartridges, .22 short.
500 loaded paper shot shells.
20,000 primers.
20,000 percussion caps.

These were put into a fire made of dry kindling wood. The pile contained about 4 cubic yards of wooden blocks, boards, &c. The cases of Ammunition were held about 1 foot from the ground by an iron frame work.

The spectators were able to stand within 20 or 30 feet of the fire, on the windward side. The Cartridges made a noise like the explosion of firecrackers in packs. The danger of approaching this fire proved to be no greater than would exist with any fire of the same size containing no explosives.

The test did not include the burning of Ammunition in paper boxes. That burned was in wooden boxes. But the manufacturers of Ammunition are inclined to believe that the results would be as harmless as in the case of the Cartridges, Primers and Percussion Caps burned in wooden boxes. As a proof, or perhaps better, a demonstration of this belief, it is the custom of the Winchester Company to burn all waste Ammunition in an iron kettle over a fire. The Ammunition is thrown in in a ladle which will hold, perhaps, ¼ cubic foot. After burning the brass is cleaned from the lead and the lead is drawn off. The experts of the company believe that large quantities of Ammunition can be burned without danger in an ordinary store fire. They believe that no explosion can be obtained from burning Ammunition except that due to the crack of the individual Cartridge. In such tests the Shells are thrown about more than the Bullets, because they are the lighter. Individual Cartridges may be thrown out of the fire unexploded by the explosion of those lying next them. In this connection the experts point to the considerable quantities of Ammunition that have been burned on board ship and on docks, without explosion.

At the fire which completely gutted the store of the Bigelow & Dowse Company at Boston, last January, large amounts of loose Ammunition were burned. The firemen knew of its existence in the store and for that reason refused to go into the building. Yet there was no indication that Bullets were thrown with dangerous force. The sound of the burning Cartridges was like that in the New York test, already described, like the explosion of firecrackers in bunches. But as a result of this fire the Bigelow & Dowse Company were compelled in rebuilding their store to establish a fire proof vault in the basement for the storage of all Ammunition. If this same rule were laid down in every city and town of the United States, the expense involvel to dealers in Ammunition would in the aggregate be prodigious. The bill which the Hardware trade alone would have to pay for storage vaults would mount up into millions of dollars, it is claimed. Consequently, tests that will demonstrate to the satisfaction of fire department officials and to insurance men that no danger exists in fires where Ammunition is burned will be welcomed by many concerns and individual business men all over the country. That is, of course, supposing that such a result were obtained in complete and final tests.

MISCELLANEOUS NOTE.

Plain Back Molders' Shovels.

The Avery Stamping Company, Cleveland, Ohio, have put on the market a new plain back molders' shovel, which for the present they will make only in the highest grade, known as their Never Break. Later they expect to furnish all other grades in this style. The blades of the shovels are made of high carbon crucible steel. It is pointed out by the company that the plain back construction makes the shovels exceptionally strong, and that they also possess the feature of remaining serviceable after the back strap has worn thin, being thus especially serviceable. This line of goods will be shipped direct to retail merchants if not carried by the jobbing trade.

Twentieth Century Encircling Clamp.

The Walter W. Woodruff & Sons Company of Mt. Carmel, Conn., have begun the manufacture of the Twentieth Century encircling clamp, which is the invention of Edward C. Carl of Hawthorne, Conn. The clamp, which is shown in the accompanying engravings, is designed for use in building up circular staved columns, square mitered-edged posts and full and half circle or oval sashes. These are a few of the possible uses of a clamp easily adapted to holding difficult shapes. The clamp consists of a tubular metal body with a forked edge, or as it is otherwise described, with a jawed foot, at one end, and an interior screw thread at the other end. The body is within a metal sleeve which has projecting pins that engage perforations at one end of the encircling steel strap. The other end of the strap is fastened to the forked edge or jaw. The loose

end of the strap passes over a rolling bearing in the jaw, the roller being hinged to permit it to be thrown back for the easy adjustment of the strap. The strap is tightened by means of a screw stem working on the body of the

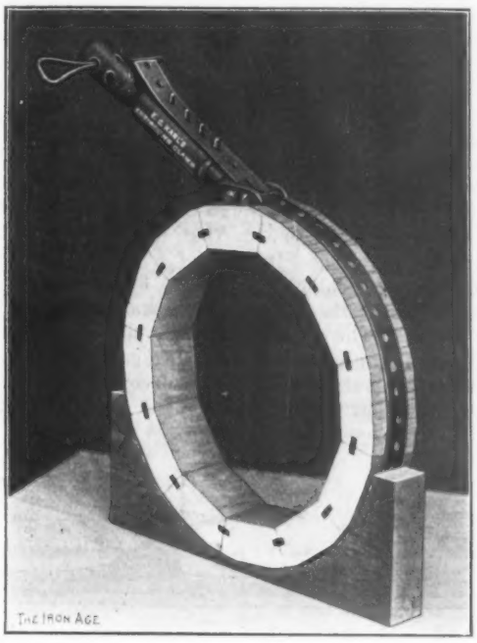


Fig. 1.—Twentieth Century Encircling Clamp.

tool, a collar on the screw preventing it working out of the sleeve. The screw is pinned into the handle, which is perforated to receive a lever when greater power is required than can be applied by the handle itself. The accompanying illustrations show two uses of the clamp, holding a staved column, also a miter edged post. The clamp has been put to practical tests by a number of

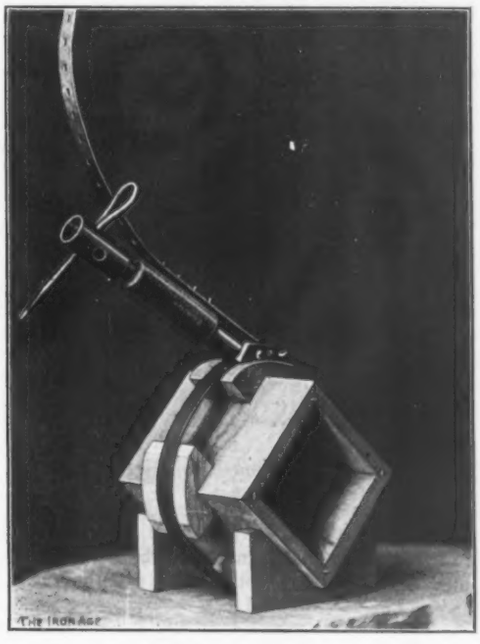
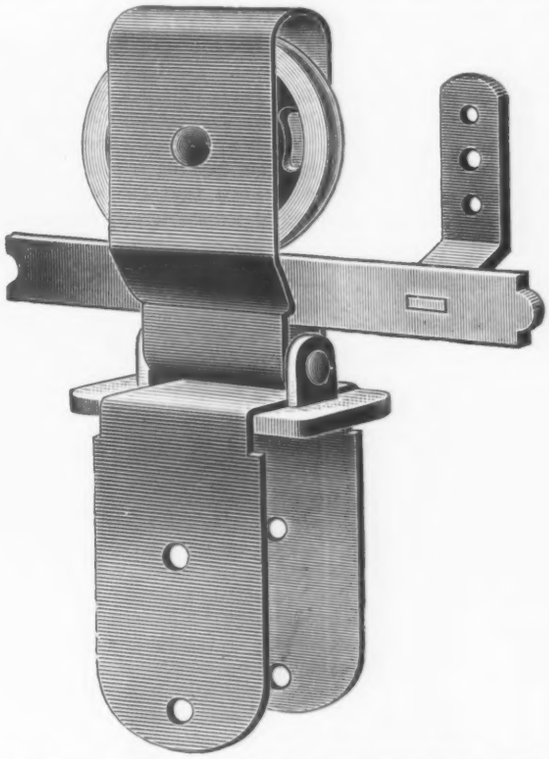


Fig. 2.—Clamp Holding Miter Edged Post.

manufacturers, and they report that it has done its work exceedingly well and fills a new place as a tool. The clamp is made of steel and malleable iron, and is referred to as strong in every detail of its construction.

The Wilcox Flexible Steel Roller Bearing Barn Door Hanger.

The accompanying cut represents a new barn door hanger, made to meet the demand of the trade for a double pendant, the joint coming directly under the track, this forming a stay on feature, which is referred to as most desirable. The track used with the hanger is 1¼ x 3-16 inch. The goods will be packed one pair in a box, complete with bolts, and one dozen boxes compose a crate.



The Wilcox Flexible Steel Roller Bearing Barn Door Hanger.

The Wilcox Mfg. Company, Aurora, Ill., are the manufacturers.

Rummel Rain Water Filter.

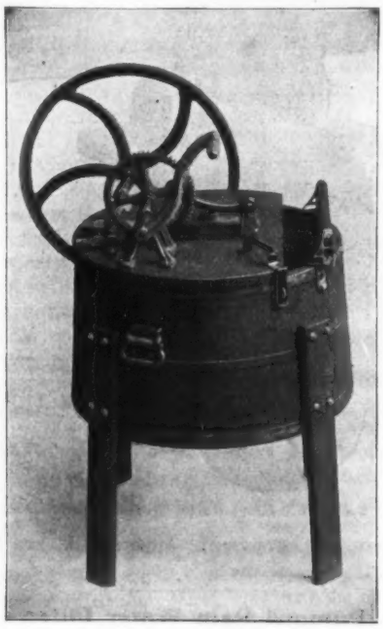
The filter shown herewith is made of galvanized iron and is described as neat, substantial, simple in construction, of so few parts that it cannot get out of order and as

Rummel Rain Water Filter.

easily taken apart and put together and very easily cleaned. The filter is designed to prevent sticks, leaves, dust, insects and other refuse which accumulate on the roof entering the cistern, thus obviating the necessity of cleaning the cistern often. The filter is manufactured by J. P. Rummel, Sioux Falls, S. D.

The Mack Washer.

S. McGranahan, Davenport, Iowa, is offering the washer illustrated herewith. The tub is of Virginia cedar with corrugated sides and bottom. The legs are bolted on with four galvanized bolts. The castings are aluminum bronze, fastened on with bolts. The wringer attachment is put on with brackets, which are bolted, and does not project over the side of the tub, making it neat and convenient to handle. It is claimed that the washer has high speed, is light running and durable. It is made on



The Mack Washer.

the rotary plan, having balance wheel and crank. The dasher is operated by a rack movement, the rack moving 4 inches and giving a two-thirds revolution to the dasher. The speed of the washer is one turn of the crank to one turn and return of the dasher. To each revolution of the crank the balance wheel revolves six times. This, it is explained, gives such a momentum to the wheel that when the rack reverses the dasher there is no jerk or unsteadiness to the running. The balance wheel can be easily removed. The machine has an improved dasher, the post of which does not project through the bottom of the block.

The Kohler Steel Shovels.

F. E. Kohler & Co., Canton, Ohio, have added a line of hollow back pattern shovels to their line of snow shovels and furnace scoops. The accompanying cut shows a new D handle of malleable iron, made heavy, with a substantial wooden grip securely bolted in. It will be seen that straps of the D extend down on the handle, and are fastened with two rivets. Regular wooden D's are furnished when desired. The blades are made of best grade open hearth shovel steel, 40 carbon. At present square

The Kohler Steel Shovels.

point shovels, with long and D handles, black or polished, also round and lime point shovels, long and D handles, can be furnished. It is expected that dies for coal shovels, No. 2 size, will be ready by October 1.

All Clamp Ladies' Gem Skate.

The line of Winslow skates, manufactured by the Samuel Winslow Skate Mfg. Company, Worcester, Mass., has been extended by the addition of a semihockey called the All Clamp Ladies' Gem, with runners of the flanged model, shown herewith. The heel is shorter than that of a full hockey skate and the runners are slightly curved, which makes them the more desirable for ladies' use. The hockey skate is having a very decided influence on the design of the modern club skate. The evolution from the old rocker skate has been sharply marked. The rocker of not so many years ago had a runner curved on a 3-feet radius, which means that ½ inch of the blade touched the ice. Then it became a 4-feet radius, and then the curve straightened out to 5-feet radius. To-day the runner of the Winslow rink skate is curved on a 7-feet radius. The Canadians used the straight-edged hockey skate long before it came into general use in the United States; but to-day it is an exceptionally popular skate here. So strong has this demand become for men's

All Clamp Ladies' Gem Skate.

hockey skates that the Winslow Company are making all their hockey skates so that they will be especially adapted for ladies' shoes. For ladies' use the toe plates are made narrow and the heel plates smaller than the men's skates, but the blades are the same as the men's. The Winslow Company have made various minor improvements to their standard goods which, they state, will warrant the claim of an entirely up to date line.

Marlin Combination Rifle Receiver Sight.

The Marlin Firearms Company, New Haven, Conn., are putting on the market the combination rifle receiver

Marlin Combination Rifle Receiver Sight.

sight shown herewith. It is small and is described as being neat, simple, strong, made of the best cast steel, and as doing away with the objections of other rear sights. All Marlin rifles made after September, 1903, will have two holes in the receiver for fastening this sight. Rifles made before that date require two holes to be drilled and tapped in the rifle receiver.

Current Hardware Prices.

REVISED SEPTEMBER 8, 1903

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer, are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33⅓@33⅓ & 10% signifies that the price of the goods in question ranges from 33⅓ per cent. discount to 33⅓ and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued June, 1903, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Abrasives—

Adamite in Carloads:
Crystal ₱ ton $90@100
Grain ₱ ton $120@140
See also *Emery*.

Adjusters, Blind—

Domestic, ₱ doz. $3.00 33⅓%
North's 10%
Zimmerman's—See *Fasteners, Blind.*

Window Stop—

Ives' Patent 35%
Taplin's Perfection 35%

Ammunition—See *Caps, Cartridges, Shells, &c.*

Anvils—American—

Armand Hammer, Wrought ₱ lb 8½@8¾c
Buel Patent Trenton ₱ lb 9½@9¾c
Eagle Anvils ₱ lb 7¼@7¾c
Hay-Budden, Wrought 9@9¼c
Horseshoe brand, Wrought 9@9¼c

Imported—

Peter Wright & Sons ₱ lb 10½c

Anvil, Vise and Drill—

Millers Falls Co., $18.00 15&10%

Apple Parers—See *Parers, Apple, &c.*

Aprons, Blacksmiths'—

Hull Bros. Co. 80&5%

Augers and Bits—

Com. Double Spur 70c&10@75&10%
Boring Machine Augers 66⅔@70%
Car Bits, 12-in. twist 60@60c&10%
Jennings' Pattern 50c&10c&5@60%
Ford's Auger and Car Bits 40&5%
Forstner Pat. Auger Bits 25%
C. E. Jennings & Co.:
No. 10 ext. lip, R. Jennings' list 25&10%
No. 30, R. Jennings' List, 40&7½&10%
Russell Jennings' 25&10&2½%
L'Hommedieu Car Bits 15&10%
Mayhew's Countersink Bits 45%
Millers' Falls 50&10&7½%
Pugh's Black 20%
Pugh's Jennings' Pattern 35%
Snell's Auger Bits 60%
Snell's Bell Hangers' Bits 50&10%
Snell's Car Bits, 12-in. twist 60%
Wright's Jennings Bits (R. Jennings' list) 50%

Bit Stock Drills—

See *Drills, Twist.*

Expansive Bits—

Clark's small, $15; large, $26 50&10%
Lavigne's Clark's Pattern, No. 1, ₱ doz., $26; No. 2, $18 50&10%
C. E. Jennings & Co., Steer's Pat. 25&10%
Swan's 60%

Gimlet Bits—

Common Double Cut..gro. $2.75@3.00
German Pattern.....gro. $4.00@4.25

Hollow Augers—

Bonney Pattern, per doz. $10.00@11.00
Ames 25&10%
New Patent 25&10%
Universal 20%
Wood's Universal 25%

Ship Augers and Bits—

Ford's 40%
Steel's 40%
C. E. Jennings & Co.:
L'Hommedieu's 15&10%
Watrous' 33⅓&10%

Awl Hafts, See *Hafts, Awl.*

Awls—

Brad Awls:
Handled.....gro. $2.75@3.00
Unhandled, Shouldered.gro.63@66c
Unhandled, Patent.....gro. 66@70c
Peg Awls:
Unhandled, Patent....gro. 31@34c
Unhandled, Shouldered.gro.65@70c
Scratch Awls:
Handled, Common..gro. $3.50@4.00
Handled, Socket..gro. $11.50@12.00
Murwood 40%

Awl and Tool Sets—See *Sets, Awl and Tool.*

Axes—

First Quality, factory brands...$5.50
First Quality, jobbers' brands.....
$5.0@5.25
Second Quality.....$4.50@4.75

Axle Grease—See *Grease, Axle*

Axles—

Iron or Steel

Concord, Loose Collar 4½@5c
Concord, Solid Collar 4¾@5½c
No. 1 Common
No. 1 ½ Com. New Style
No. 2. Solid Collar
Nos. 11 to 14
Nos. 15 to 18
Nos. 19 to 22
} See Trade Report.

Boxes, Axle—

Common and Concord, not turned..
15. 4¼@4½c
Common and Concord, turned.....
lb. 5@5½c
Half Patent.....lb. 9@9½c

Balances—Sash—

Caldwell new list 50%
Pullman's 60%

Spring—

Spring Balances..... 60@60&5%
Chatillon's:
Light Spg. Balances. 40&10%
Straight Balances. 40%
Circular Balances 50%
Large Dial 30%
Pelouze 50%

Barb Wire—See *Wire, Barb.*

Bars—Crow—

Steel Crowbars, 10 to 40 lb., per lb..
5@3½c

Towel—

No. 10 Ideal, Nickel Plate.....₱ gro. $8.50
No. 20 Ideal, Brass Finish.....₱ gro. $8.50

Baskets—

Hoffman's Brick Baskets. .....each $3.25

Beams, Scale—

Scale Beams, List Jan. 12, '85.40c&10%
Chattillon's No. 1 30%
Chattillon's No. 2 40%

Beaters—Egg—

Lightning Chain, ₱ doz, $1.15; ₱ gro... $12.00
National Mfg. Co.: ₱ gro.
No. 1 Dover, Family size $7.00
No. 2 Dover, Hotel size.....11.00
Taplin Mfg. Co.: ₱ gro.
No. 60 Improved Dover.....$6.50
No. 75 Improved Dover.....7.50
No. 75-2 Imp'd Dover, Tin'd.....8.00
No. 100 Improved Dover.....8.00
No. 102 Improved Dover, Tin'd...8.50
No. 150 Improved Dover, Hotel. $15.00
No. 152 Imp'd Dover, Hotel, Tin'd. 7.00
No. 200 Imp'd Dover Tumbler.....9.00
No. 202, Imp'd Dover Tumbler Tin'd $10.00
No. 300, Imp'd Dover Mammoth, ₱ doz.....$7.00
Wonder (S. S. & Co.).....₱ gro. $6.00

Bellows—

Blacksmith, Standard List..75@75&5%

Blacksmiths'—

Inch..	*30*	*32*	*34*	*36*	*38*	*40*
Each	*$3.50*	*3.75*	*4.25*	*4.80*	*5.35*	*6.15*

Extra Length:
Each..$4.00 4.55 5.10 5.60 6.40 7.50

Molders—

Inch.....	*10*	*12*	*14*
Doz.....	*$8.50*	*10.00*	*13.00*

Hand—

Inch.....	*6*	*7*	*8*	*9*	*10*
Doz.....	*$4.25*	*4.50*	*5.00*	*6.50*	*7.75*

} Net Prices.

Bells—Cow—

Ordinary goods.....75&5@75&10%
High grade. .....70&10@70&10&5%
Jersey 75&10%
Texas Star 50%

Door—

Abbe's Gong 45%
Barton Gong 55%
Home, R. & E. Mfg. Co.'s 55&10%
Lever and Pull, Sargent's ....60&10&10%
Yankee Gong 35%

Hand—

Hand Bells, Polished....60&5@60&10%
White Metal .....55@55&10%
Nickel Plated.....50@55&5%
Swiss .....60@60&7½%
Cone's Globe Hand Bells...33⅓@33⅓&10%
Silver Chime 33⅓@33⅓&10%

Miscellaneous—

Farm Bells..... lb. 2@2½c
Steel Alloy Church and School.. ...
60@60&5%
American Tube & Stamp'g Co. Gongs 75%
Table Call Bells 50@50&10%
Trip Gong Bells 55&10@60%

Belting—Rubber—

Agricultural (Low Grade)..75@75&5%
Common Standard.....70@70&10%
Standard.....65@70%
Extra.....60&5@60&10%
High Grade..... ...50&5@50&10%
Boston Belting Co.:
Seamless Stitched Imperial..... 45&5%
Boston 50&5%
Niagara 60&5%

Leather—

Extra Heavy, Short Lap....60@60&5%
Regular Short Lap 60&10@60&10&10%
Standard .....70@70&5%
Light Standard.....70&10%
Cut Leather Lacing.....60&10%
Leather Lacing Sides, per sq. ft..18c

Bench Stops—See *Stops, Bench*

Benders and Upsetters, Tire—

Detroit Perfected Tire Bender.....40%
Green River Tire Benders and Upsetters 20%
Detroit Stoddard's Lightning Tire Upsetters, No. 1, $4.25; No. 2, $7.25; No. 3, $10.50; No. 4, $16.25; No. 5, $30.50.

Bicycle Goods—

John S. Leng's Son's 1903 list:
Chain 50%
Parts 50%
Spokes 50%
Tubes 60%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.—See *Augers and Bits.*

Blocks—Tackle—

Common Wooden.....70&10@75&5%
Hollow Steel Blocks, with Ford's Patent Sheaves 50&10%
Lane's Patent Automatic Lock and Junior 30%
Stowell's Novelty, Mal. Iron.....50&10%
See also *Machines, Hoisting.*

Boards Stove—

Zinc, Crystal, &c.....30c&10@40c&10%

Bolts—

Carriage, Machine, &c.—

Common Carriage....60&10c&10@70%
Phila. Eagle, $3.00 list May 24, '99....
80@80c&5%
Bolt Ends, list Feb. 14, '95..65c&5@65c&10%
Machine, list Oct. 1, '99..... .65@65c&5%
Machine with C & T. Nuts.....
60c&2½@...%

Door and Shutter—

Cast Iron Barrel, Round Brass Knob:

Inch.....	*3*	*4*	*5*	*6*	*8*
Per doz...	*$0.26*	*.30*	*.39*	*.41*	*.65*

Cast Iron Spring Foot:

Inch	*6*	*8*	*10*
Per doz.....	*$1.00*	*1.25*	*1.75*

Cast Iron Chain, Flat, Japanned:

Inch.....	*6*	*8*	*10*
Per doz	*$0.75*	*1.05*	*1.30*

Cast Iron Shutter, Brass Knobs:

Inch.....	*6*	*8*	*10*
Per doz.....	*$0.57*	*.80*	*1.00*

Wrt Barrel, Jap'd..75&10@75&10&10%
Wrought " Bronzed.50c&5@50c&10%
Wrought Flush, B. K..50c&10@60c&10%
Wrought Shutter...40c&10c&10@60c&5%
Wrought Square Neck.....50@50&10%
Wrought Sunk, Flush....50@50&10%
Ives' Patent Door 60%

Stove and Plow—

Plow .....60@60c&5%
Stove.....80@80c&10%

Tire—

Common.....72½@72½c&10%
Norway Iron.....80@80c&5%
American Screw Company:
Norway Phila., list Oct. 16, '84.....80%
Eagle Phila., list Oct. 16, '84.....82½%
Bay State, list Dec. 28, '99.....72½%
Franklin Moore Co.:
Norway Phila., list Oct. 16, '84....80%
Eagle Phila., list Oct. 16, '84.....82½%
Eclipse, list Dec. 28, '99.....72½%
Russell, Burdsall & Ward Bolt & Nut Co.
Empire, list Dec. 28, '99.....72½%
Norway Phila., list Oct. '84.....80%
Upson Nut Co.:
Tire Bolts.....72½%

Borers, Tap—

Borers Tap, Ring, with Handle:

Inch.....	*1¼*	*1⅜*	*1¾*	*2*
Per doz..	*$4.30*	*5.00*	*5.75*	*7.25*
Inch	*2¼*		*2½*	
Per Doz.....	*$8.05*		*11.50*	

Enterprise Mfg. Co., No. 1, $1.35; No. 2, $1.65; No. 3, $2.50 each 25%

Boxes, Mitre—

C. E. Jennings & Co. 25&10%
Langdon 15&10%
Schatz 40%

Braces—

NOTE.—*Most Braces are sold at net prices.*
Common Ball, American..$1.15@1.25
Barber's 50&10&10@60&10%
Fray's Genuine Spofford's 60%
Fray's No. 70 to 120, 81 to 123, 207 to 414 60%
C. E. Jennings & Co. 50&5&10%
Mayhew's Ratchet 60%
Mayhew's Quick Action Hay Patent..50%
Millers Falls Drill Braces 25&10%
P., S. & W. Co. Peck's Patent 60&10@65%

Brackets—

Wrought Steel.....80@80c&5%
Bradley's Wire Shelf:
Full cases 85%
Broken cases 80&10&10%
Griffin's Pressed Steel 80%
Griffin's Folding Brackets.... ....70&10%

Bright Wire Goods—See *Wire and Wire Goods.*

Broilers—

Wire Goods Co. 75@75&10%

Buckets, Well and Fire—See *Pails*

Bucks Saw—

Hoosier ₱ gro. $36.00

Bull Rings—See *Rings, Bull.*

Butts—Brass—

Wrought list Sept., '96....30@30c&10%
Cast Brass, Tiebout's 50%

Cast Iron—

Fast Joint, Broad.....50@50c&10%
Fast Joint, Narrow.....50@50c&10%
Loose Joint.....70c&5@70c&10%
Loose Pin .....70c&5@70c&10%
Mayer's Hinges.....70&5@70c&10%
Parliament Butts.....70c&5@70c&10%

Wrought Steel—

Table and Back Flaps.....75%
Narrow and Broad.....75%
Inside Blind.....75&10%
Loose Pin.....75c&10%
Loose Pin, Bak and Steeple Tip 62½%
Japanned, Bail Tip Butts.70c&1%
Bronzed Wrt. Nar. and Inside Blind Butts.....55c&10%
} Extra 10@10&10%

Cages, Bird—

Hendryx, Brass:
3000, 5000, 1100 series 5%
1200 series 33⅓%
200, 300, 600 and 900 series 40&10%
Hendryx Bronze:
700, 800 series 40&10%
Hendryx Enameled 40&10%

Calipers—See *Compasses.*

Calks, Toe and Heel—

Blunt, 1 prong.....per lb. 4@4¼c
Sharp, 1 prong.....per lb. 4¼@4¾c
Perkins' Blunt Toe ₱ lb 4½¢
Perkins' Sharp Toe ₱ lb 4 ¢

Cannons—

Breech Loading, 32 cal. Cartridge, Toy Cannons.....per doz. $2.00

Can Openers—See *Openers, Can*

Cans, Milk—

	5	8	10 gal.	
Illinois Pattern.	$1 50	2.00	2.25	each.
Iowa Pattern...	....	2.35	2.50	each.
	20	30	40	qts.
New York Patt'rn	1.65	2.40	2.75	each.
Baltimore Patt'rn	....	1.80	2.00	each.

Cans, Oil—

Buffalo Family Oil Cans:

3	5	10 gal.
$48.00	60.00	120.00 gro

Caps—Percussion—

Eley's E. B. 60c
G. D. ..... *per M* 34@35c
F. L. ..... *per M* 40@45c
G. E. ..... *per M* 50@55c
Musket ..... *per M* 62@65c

Primers—

Berdan Primers, $1.00 per M 5%
B. L Caps (Sturtevant Shells) $1.00 per M 5%
All other primers per M. $1.22@$1.27

Cartridges—

Blank Cartridges:
32 C. F., $5.50 ..... 10@5%
38 C. F., $7.00 ..... 10@5%
22 cal. Rim, $1.[illegible] ..... 10@5%
32 cal. Rim, $2.75 ..... 10&5%
R. B. Caps, Con... ll Swgd. $1.90
B. B. Caps, Round Ba[illegible] $1.49
Central Fire 25%
Target and Sporting Rifle ..... 5@5%
Primed Shells and Bullets ..... 15@10%
Rim Fire Sporting 50%
Rim Fire, Military ..... 15&5%

Cases, Show—

Sun, No. 102, Silent Salesman, 6 ft., $25.00

Casters—

Bed ..... 70@70&10%
Plate ..... 60@60&5%
Philadelphia ..... 70@70&10%
Boss ..... 70@10%
Boss Anti-Friction ..... 70&10%
Martin's Patent "Phoenix) 45%
Standard Ball Bearing 50%
Tucker's Patent Low Ills 80%

Cattle Leaders—

See *Leaders, Cattle.*

Chain, Coil—

American Coil, Jobbers' Shipments:

3-16	¼	5-16	⅜	7-16	½	9-16
8.50	5.50	4.50	4.00	3.80	3.70	3.65
⅝	¾	⅞	1 to 1¼ inch.			
3.60	3.55	3.50	3.40	per 100 lb.		

German Coil ..... 60&10@10%

Halters and Ties—

Halter Chains ..... 60@10@60@10@10%
German Halter Chains, list July 24, '97 ..... 60&10@10@70@10%
Cow Ties ..... 60@60@10%

Trace, Wagon, &c.—

Traces, Western Standard: 100 pair
6½—6-3, Straight, with ring...$26.00
6½—6-2, Straight, with ring.. $26.50
6½—6-3, Straight, with ring.. $30.00
6½—10-2, Straight, with ring..$35.00
Add 2¢ per pair for Hooks.
Twist Traces 2¢ per pair higher than Straight Link.
Trace, Wagon and Fancy Chains.. 60@60@10%

Miscellaneous—

Jack Chain, list July 10, '93:
Iron ..... 60@10@60@10@10%
Brass ..... 60@10@60@10@10%
Safety Chain ..... 70@10@75@5%
Gal. Pump Chain ..... lb. 4½@4¾c
Covert Mfg. Co.
Breast ..... 40&2%
Halter ..... 40&2%
Heel ..... 40&2%
Rein ..... 40&2%
Stallion ..... 40&2%
Covert Sad. Works:
Breast 70%
Halter 70%
Hold Back 70%
Rein 70%
Oneida Community:
Am. Coil and Halters ..... 40@—5&5%
Am. Cow Ties ..... 45@50%
Eureka Coil and Halter ..... 45@50&5%
Niagara Coil and Halters ..... 45@50&5%
Niagara Cow Ties ..... 45&5@50&10@25%
Wire Dog Chains ..... 45@50&5%
Wire Goods Co.:
Dog Chain ..... 70&10%
Universal Dbl-Jointed Chain 50%

Chalk—(From Jobbers.)

Carpenters' Blue ..... gro. 40c
Carpenters', Red ..... gro. 35c
Carpenters', White ..... gro. 30c
See also Crayons.

Checks, Door—

Bardsley's 45%
Columbia ..... 50&10%
Eclipse 60%

Chests, Tool—

American Tool Chest Co.:
Boys' Chests, with Tools 55%
Youths' Chests, with Tools 40%
Gentlemens' Chests, with Tools 30%
Farmers', Carpenters', etc., Chests, with Tools 30%
Machinists' and Fitters' Chests, Empty 50%
C. E. Jennings & Co.'s Machinists' Tool Chests ..... 33⅓&10%

Chisels—

Socket Framing and Firmer

Standard List ..... 70@70@10%
Buck Bros. 30%
Charles Buck 30%
C. E. Jennings & Co. Socket Firmer No. 10 ..... 60&10%
C. E. Jennings & Co. Socket Framing No. 15 ..... 60&10%
Swan's 70%
L. & I. J. White ..... 80@30&5%

Tanged—

Tanged Firmers ..... 40@5@40&10%
Buck Bros. 30%
Charles Buck 30%
C. E. Jennings & Co. Nos. 191, 181 ..... 16%&10%
L. & I. J. White, Tanged ..... 25&5%

Cold—

Cold Chisels, good quality. lb, 13@15c
Cold Chisels, fair quality..lb, 11@12c
Cold Chisels, ordinary.....lb. 9 @10c

Chucks—

Beach Pat., each $8.00.. ..... 35&5%
Pratt's Positive Drive 25%
Empire 25%
Blacksmiths' 25%
Skinner Patent Chucks:
Combination Lathe Chucks 40%
Drill Chucks, Patent and Standard 30%
Drill Chucks, New Model 25%
Independent Lathe Chucks 40%
Improved Planer Chucks 25%
Universal Lathe Chucks 40%
Face Plate Jaws 40%
Standard Tool Co.:
Improved Drill Chuck 45%
Union Mfg. Co.:
Combination 40%
Car Drill 30%
Geared Scroll 30%
Independent 40%
Union Drill 30%
Universal 40%
Face Plate Jaws 35%
Wescott Patent Chucks:
Lathe Chucks 50%
Little Giant Auxiliary Drill 40%
Little Giant Double Grip Drill 40%
Little Giant Drill, Improved 40%
Oneida Drill 40%
Scroll Combination Lathe 40%

Clamps—

Adjustable, Hammers' ..... 20@20&5%
Cabinet Carpenters' ..... 50&10%
Carriage Makers', P., S. & W. Co. 50%
Carriage Makers' Sargent's 60%
Besly, Parallel ..... 33⅓&10%
Lincoln Utility Drop Forged Tool Co. 40%
Screw Clamps, see *Vises, Saw Filers'.*

Cleaners, Drain—

Iwan's Champion, Adjustable 55%
Iwan's Champion, Stationary 40%

Sidewalk—

Star Socket, All Steel.... ₱ doz. $4.05 net
Star Shank, All Steel.... ₱ doz. $3.24 net
W. & C. Shank, All steel, 7½ in. ₱ doz., $3.05; 8 in., $3.10; 8½ in., $3.25.

Cleavers, Butchers'—

Foster Bros. 30%
New Haven Edge Tool Co.'s 45%
Fayette R. Plumb... .... 33⅓@33⅓&10%
P., S & W ..... 50@50&5%
L. & I. J. White 30%

Clippers—

Chicago Flexible Shaft Company:
'98 Chicago Horse $8.75
1902 Chicago Horse $10.75
Lightning Belt $15.00
Chicago Belt $20.00
Stewart's Patent Sheep $18.50
} 15%

Clips, Axle—

Eagle and Superior ¼ and 5-16 inch ..... 70&10%
Norway, ¼ and 5-16 inch.. 70@70&10%

Cloth and Netting, Wire —See *Wire, &c.*

Cocks, Brass—

Hardware list:
Compression and Plain Bibbs..... 65&10@70%
Globe, Kerosene, Racking, &c., Cocks ..... 65&5@70&5%

Coffee Mills—See *Mills, Coffee.*

Collars, Dog—

Brass, Walter B. Stevens & Son's list. 40%
Embossed, Gilt, Walter B. Stevens & Son's list ..... 30&10%
Leather, Walter B. Stevens & Son's list 40%

Combs, Mane and Tail—

Covert's Saddlery Works ..... 60&10%

Compasses Dividers, &c.

Ordinary Goods ..... 75@75&5%
Bemis & Call Hdw. & Tool Co.:
Dividers 65%
Calipers, Double 65%
Calipers, Inside or Outside 65%
Calipers, Wing 60%
Compasses 50%
J. Stevens A. & T. Co ..... 45&10%

Compressors, Corn Shock—

J. B. Hughes' ₱ doz. $2.50

Conductor Pipe, Galva.—

L. C. L. to Dealers:

Territory.	*Nested.*	*Not nested.*
Eastern....	*7¼@12½%*	*7¼@7½%*
Central.....	*7¼@7½%*	*7%*
Southern...	*65&10%*	*65&5%*
S. Western..	*65&7½%*	*65&2½%*

Terms, 2% for cash. With delivery on full crates.
See also *Eave Troughs.*

Coolers, Water—

Gal. each.	2	3	4	6	8
Labrador	$1.20	$1.50	$1.80	$2.10	2.70
Gal.	2	3	4	6	8
Iceland, ea.	$1.80	$2.10	$2.40	$3.00	
Gal.	2	3	4	6	8
Galv. Lined Ea.	$1.35	$2.00	$2.25	$2.90	$3.90

25%

Galv. Lined side handles

Gal.	2	3	4	6	8
Each.	$1.95	$2.15	$2.40	$3.30	$4.15..25%

Coopers' Tools—

See *Tools, Coopers'.*

Cord— Sash—

Braided, Drab ..... lb. 27@28c
Braided, White, Com ..... lb. 19@22c
Cable Laid Italian..lb. A, 15c; B, 16c
Common India ..... lb. 10@10½c
Cotton Sash Cord, Twisted....16@20c
Patent Russia ..... lb. ..@13c
Cable Laid Russia ..... lb. ..@14c
India Hemp, Braided ..... lb. ..@18c
India Hemp, Twisted ..... lb. 12@13c
Patent India, Twisted ..... lb. 12@13c
Anniston Cordage Co.:
Old Glory, Nos. 7 to 12 ..... ₱ lb 24 ¢
Anniston, Nos. 7 to 12 ..... ₱ lb 19 ¢
Old Colony, Nos. 7 to 12 ..... ₱ lb 18½¢
Anniston Drab, Nos. 7 to 12 ..... ₱ lb 24 ¢
Pearl Braided, cotton, No. 6 ₱ lb., 20¢; Nos. 7 to 12, 19¢.
Massachusetts, White ..... ₱ lb 22½¢
Massachusetts, Drab ..... ₱ lb 26½¢
Eddystone Braided Cotton ..... ₱ lb 19¢
Harmony Cable Laid Italian ..... ₱ lb 18¢
Peerless:
Cable Laid Italian ..... 16¢
Cable Laid Russian ..... 14¢
Cable Laid India ..... 12¢
Braided India ..... 18¢
Phœnix, White ..... 19¢
Samson, Nos. 7 to 12:
Braided, Drab Cotton ..... 32½¢
Braided, Italian Hemp ..... ₱ lb 32½¢
Braided, Linen ..... ₱ lb 49¢
Braided, White Cotton, Spot ₱ lb 28½¢
No. 6 cords, 1¢ extra.
Silver Lake:
A quality, Drab, 40¢ 15%
A quality, White, 35¢ 15%
B quality, Drab, 35¢ 15%
B quality, White, 30¢ 15%
Italian Hemp, 40¢ 15%
Linen, 57½¢ 15%

Wire, Picture—

List Oct., '00 ..... 85&10@85&10@10&5%

Cradles—

Grain 50%

Crayons—

White Round Crayons, gross..5½@6c
Cases, 100 gro., $4.00, at factory.
D. M. Steward Mfg. Co.
Metal Workers' Crayons. gr. $2.50
Soapstone Pencils, round, flat or square ..... gr. $1.50
Rolling Mill Crayons ..... gr. $2.50
Railroad Crayons (composition) gr. $2.00
} Case lots 20%
See also *Chalk.*

Crooks, Shepherds'—

Fort Madison, Heavy ..... ₱ doz. $7.00
Fort Madison, Light ..... ₱ doz. $6.50

Crow Bars—See *Bars, Crow.*

Cultivators—

Victor Garden 50%

Cutlery, Table—

International Silver Company:
No. 12 Medium Knives, 1847... ₱ doz. $3.50
Star, Eagle, Rogers & Hamilton and Anchor ..... ₱ doz. $3.00
Wm. Rogers & Son ..... ₱ doz. $2.50
Simeon L. & Geo. H. Rogers Company:
12 dwt. Medium Knives..... ₱ doz. $3.00
No. 77 Medium Knives..... ₱ doz. $2.50

Cutters— Glass—

H. H. Mayhew Co. 40%
Red Devil 50%
Smith & Hemenway Co. 40%
Woodward 40%

Meat and Food—

American 30%

Nos.	1	2	3	4	B	5
Each	$5	$7	$10	$25	$5(	$0(

Enterprise ..... 25@25..7½%

Nos.	5	10	12	22	3(
Each	$2	$3	$2.75	$4.50	$(

Dixon's, ₱ doz. ..... 30&10@40%

Nos.	1	2	3	4
	$14.00	$17.00	$19.00	$3(.00

Home No. 1, ₱ doz. $22.75 ..... .50&10%
Little Giant, ₱ doz. ..... 33⅓&5(.40%

Nos.	305	310	312	320	322
	$35.00	$48.00	$44.00	$72.00	$68.00

N. E Food Choppers 40%
Sterling ..... 40@10&1 %
No 1 ...$2.00 each No. 2 . $2.50 each
New Triumph No. 605, ₱ doz. $24.00 ..... 30&10@40%
Woodruff's, ₱ doz ..... 30&10@40%

Nos	100	150
	$15.00	$18.00

Enterprise Beef Shavers ..... .35@30%

Slaw and Kraut—

Henry Disston & Sons:
Slaw, Corn Grater, &c 40%
Kraut Cutters 24 x 7, 26 x 8, 30 x 9. 55%
Kraut Cutters 36 x 12, 40 x 12 ..... 40%
J. M. Mast Mfg. Co.:
Slaw Cutters, 1 Knife ..... ₱ doz. $3.00
Combined Slaw Cutter and Corn Grater ..... ₱ doz. $4.00
Sterling $6.00 each 33⅓%
Tucker & Dorsey Mfg. Co.:
Kraut Cutters 40%
Slaw Cutters, 1 Knife, ₱ gr. ...$18@$20
Slaw Cutters, 2 Knife, ₱ gr. ...$22@$36

Tobacco—

All Iron, Cheap.....doz. $1.25@$4.50
Enterprise ..... 25@50%
National, ₱ doz. No. 1, $21; No. 2, $18.. 40%
Sargent's, ₱ doz., No. 2 ..... 60%
Sargent's No 12 and 21 ..... 60&10%

Washer—

Appleton's, ₱ doz. $16.00 ..... 50&10%
Bonney's 33⅓%

Diggers, Post Hole, &c.—

Dalbey Post Hole Auger...per doz., $9.00
Iwan's Improved Post Hole Auger. 40&5%
Iwan's Vaughan Pattern Post Hole Augers, ₱ doz. $6.75
Iwan's Perfection Post Hole Digger... ₱ doz. $4.50
Iwan's Split Handle Post Hole Diggers, ₱ doz. $7.50
Kohler's Universal ..... ₱ doz. $15.00
Kohler's Little Giant ..... ₱ doz. $12.00
Kohler's Hercules ..... ₱ doz. $10.00
Kohler's Invincible ..... ₱ doz. $9.00
Kohler's Rival ..... ₱ doz. $8.50
Kohler's Pioneer ..... ₱ doz. $7.50
Never-Break Post Hole Diggers, ₱ doz. $24.00 ..... 60%
Samson, ₱ doz. $34.00 ..... 25%

Dividers—See *Compasses.*

Doors, Screen—

Phillips', style E, ¼ in. ..... ₱ doz, $10.50
Phillips', style 077, ¼ in. ..... ₱ doz, $8.00
Phillips', style x-y, ¼ in. ..... ₱ doz, $11.00
Porter's Plain, No. 6 ..... ₱ doz. $6.75
Porter's Ornamental, No. 70. ₱ doz. $10.50
Porter's No. 99 ..... $9.00
Porter's No. 44 ..... $10.75

Drawers, Money—

Sun Money Drawers, No. 5, ₱ doz. $8.[illegible]
No. 6, with Bell, $10.00; No. 6, with Gong, $10.50.
Tucker's Pat. Alarm Till No. 1, ₱ doz. $18; No. 2, $15; No. 3, $12; No. 4, $1[illegible]

Drawing Knives—

See *Knives, Drawing.*

Drills and Drill Stocks—

Common Blacksmiths' Drill..each $1.50@$1.7[illegible]
Breast, Millers Falls ..... 15&10%
Breast, P., S. & W ..... 40&10%
Goodell Automatic Drills..40&5@40&10%
Johnson's Automatic Drills Nos. 2 and 3 ..... 16%&10%
Johnson's Drill Points ..... 16%&5&10%
Millers Falls Automatic Drills ..... 33⅓&10%
Ratchet, Curtis & Curtis 25%
Ratchet, Parker's 40%
Ratchet, Weston's 33⅓%
Ratchet, Whitney's, P. S. & W 50%
Whitney's Hand Drill, No. 1, $10.00; Adjustable, No. 10, $12.00 ..... 33⅓%

Twist Drills—

Bit Stock ..... 60@10@60@10@10%
Taper and Straight Shank ..... 60@10@60@10@10%

Drivers, Screw—

Screw Driver Bits..per doz. ..45@75c
Baisey's Screw Holder and Driver, ₱ doz. 2½-inch, $6; 4-in., $7.50 6-in., $9. 40%
Buck Bros' Screw Driver Bits 30%
Champion 50%
Edson 60%
Fray's Hol. H'dle Sets, No. 3, $12.00 50%
Gay's Double Action Ratchet 35%
Goodell's Auto 50&10&10@50&10&10&5%
Hurwood 40%
Mayhew's Black Handle 50%
Mayhew's Monarch ..... 40&10%
Millers Falls, Nos. 20 and 21 ..... 25&10%
Millers Falls, Nos. 11, 12, 41, 42 ..... 15&10%
Never Turn 60%
New England Specialty Co. 50%
Sargent & Co.'s:
Nos. 1, 50, 55 and 60 ..... 60%
Nos. 20 and 40 ..... 70%
Smith & Hemenway Co ..... 40&5%
Stanley's R. & L. Co.'s:
No. 64, Varnished Handles 30@60&10&10%
No. 86 ..... 70@70&10&10%
Swan's:
Nos. 65 to 68 ..... 50%
No. 40 ..... 40&10%
Nos. 25, 35 and 45 ..... 30&10&10%

Eave Trough, Galvanized

Territory.	*L. C. L.*
Eastern	*75@16%&5%*
Central	*75@12½%*
Southern	*75@2½%*
S. Western	*75%*

Terms, 2% for cash.
See also *Conductor Pipe and Elbows.*

Elbows and Shoes—

Factory shipments 60%
Perfect Elbows (S. S. & Co.) 30%

Emery, Turkish—

	4 to 6	*5 to 150*	*Flour*
Kegs ..... *lb.*	*5c*	*5½c*	*3½c*
½ Kegs ..... *lb.*	*5½c*	*5¾c*	*3¾c*
Kegs ..... *lb*	*5c*	*6c*	
10-lb cans. 10 in case	*6½c*	*7c*	*6c*
10-lb. cans, less than 10	*10c*	*10c*	*8c*

NOTE.—*In lots 1 to 3 tons a discount of 10% is given.*

Extractors, Lemon Juice —See *Squeezers, Lemon.*

Fasteners, Blind—

Zimmerman's ..... 50&10%
Walling's 50%

Cord and Weight—

Yale 40%

Faucets—

Cork Lined ..... 50@50&10%
Metallic Key, Leather Lined 70@70&10%
Red Cedar ..... 40@40&10%
Petroleum ..... 70&10@75%
B. & L. B. Co.:
Metal Key ..... 60&10%
Star 60%
West Lock ..... 50&10%
John Sommer's Peerless Tin Key 40%
John Sommer's Boss Tin Key 50%
John Sommer's Victor Metal Key. 50&10%
John Sommer's Duplex Metal Key 60%
John Sommer's Diamond Lock 40%
John Sommer's I. X. L. Cork Lined 50%
John Sommer's Reliable Cork Lined ..... 50&10%
John Sommer's Chicago Cork Lined..60%
John Sommer's O. K. Cork Lined 50%
John Sommer's No Brand, Cedar 50%
John Sommer's Perfection Cedar 40%
McKenna, Brass:
Burglar Proof, N. P 35%
Improved ¼ and ⅛ inch 35%
Self Measuring:
Enterprise, ₱ doz. $36.00 ..... .40&10%
Lane's, ₱ doz. $36.00 ..... 40&10%
National Measuring, ₱ doz. $36..40&10%

Felloe Plates—

See *Plates, Felloe.*

Files—Domestic—

List revised Nov. 1, 1899.
Best Brands ..... *70@5@70@10@5%*
Standard Brands. 75@5@75@10@5%
Second Quality ..... *75@10@10@80@5%*

Imported—

Stubs' Tapers, Stubs' list, July 24, '97 ..... %

Fixtures, Grindstone—

Net Prices:

Inch....	*15*	*17*	*19*	*21*	
Per doz.	*$2.85*	*3.00*	*3.50*	*4.00*	*4.75*

P., S. & W. Co. ..... 30&10@[illegible]%
Reading Hardware Co. ..... %
Sargent's ..... 60&10&[illegible]%
Stowell's Giant Grindstone Hanger, ₱ doz. $6.00
Stowell's Grindstone Fixtures, Extra Heavy ..... 50&10&[illegible]%
Stowell's Grindstone Fixtures Light ..... 60&[illegible]%

Fodder Squeezers—

See *Compressors.*

Forks—*Aug. 1, 1899, list.*
Hay, 2 tine.....60%
Hay, 3 tine.....60&10&7½%
Hay, 4 tine.....60&10%
Hay, Header and Baler 3 tine 60&15%
Hay, Header and Baler, 4 tine 60%
Grain or Barley.....70%
Manure, 4 tine.....60&20%
Manure, 5 and 6 tine.....60&20%
Spading.....70&5%
Extra 10%
Dowagiac Easy Potato.....85%
Victor, Hay.....60&5%
Victor, Manure.....60%
Victor, Header.....60&5%
Champion, Hay.....60&5%
Champion, Manure.....60&20%
Columbia, Hay.....60&5%
Columbia, Manure.....70%
Columbia, Spading.....70&10%
Hawkeye Wood Barley 4 tine ₱ doz. $5.00; 6 tine, $6.00.
W. & C. Potato Digger.....65%
Acme Hay.....60&10&7½%
Acme Manure, 4 tine.....60&20&10%
Acme Manure, 6 tine.....60%&10&2%
Dakota Header.....65&15&5%
Jackson Steel Barley.....65&15&5%
Kansas Header.....65%
W. & C. Favorite Wood Barley 4 tine, ₱ doz., $5.00; 6 tine, $6.00
Plated.—See *Spoons*.

Fountains, Stock—

Double Dewey.....₱ doz. $18.00

Frames— Saw—

White, Straight Bar, per doz. 75@80c
Red, Straight Bar, per doz $1.00@$1.25
Red, Double Brace, per doz. $1.40@1.50

Freezers, Ice Cream—

Qts...	*2*	*3*	*4*	*6*	*8*	*10*
Best..	$1.45	1.65	1.95	2.40	3.20	4.00
Good	$1.25	1.40	1.60	2.00	2.70	3.60
Fair..	$1.00	1.10	1.30	1.75	2.30	2.90

Fruit and Jelly Presses—

See *Presses, Fruit and Jelly.*

Fry Pans—See *Pans, Fry.*

Fuse— *Per 1000 Feet.*

Hemp Fuse.....$2.60
Cotton Fuse.....2.90
Single Taped Fuse.....3.25
Double Taped Fuse.....4.30
Triple Taped Fuse.....5.00
10&2½%

Gates, Molasses and Oil—

Stebbins' Pattern.....80@80&10%

Gauges—

Marking, Mortise, &c......50&10@50&10&10%
Chapin-Stephens Co.:
Marking, Mortise, etc.50&10@50&10&10%
Scholl's Patent.....50&10@50&10&10%
Door Hangers.....50@50&10%
Fulton's Butt Gauge.....30&10%
Stanley R. & L. Co.'s Butt & Babbet Gauge.....90@20&10&10%
Wire, Brown & Sharpe's.....25%
Wire, Morse's.....25%
Wire P., S. & W. Co.....30&10%

Gimlets— Single Cut—

Nail, Metal, Assorted, gro. $1.50@1.75
Spike, Metal, Assorted gro. $2.80@3.50
Nail, Wood Handled, Assorted, gro. $1.75@2.00
Spike, Wood Handled, Assorted gro. $4.25@4.50

Glass, American Window

Jobbers' List, Dec. 16, 1902.
Single and Double:
From store, First Three Brackets.. 90&5%
From store, all sizes above....90&15%

Glasses, Level—

Chapin-Stephens Co.....60@60&10&10%

Glue—Liquid, Fish—

Bottles or Cans, with Brush...25@50%
Cans (½ pts., pts., qts., ½ gal., gal.).....25@48%
International Glue Co. (Martin's).....40&10&50%

Grease, Axle—

Common Grade.....*gro. $4.50@5.50*
Dixon's Everlasting....10-lb pails, ea. 85¢
Dixon's Everlasting, in bxs..₱ doz. 1 lb $1.20; 2 lb $2.00

Grips, Nipple—

Perfect Nipple Grips.....40&10&2%

Griddles, Soapstone—

Pike Mfg. Co.....33⅓@33⅓&10%

Grindstones—

Bicycle Emery Grinder.....$6.50
Bicycle Grindstones, each.....$2.50@3.00
Pike Mfg. Co:
Improved Family Grindstones, per inch, per doz.....$3.00
Pike Mower Knife and Tool Grinder, each.....$6.00
33⅓%
Velox Ball Bearing, mounted, Angle Iron Frames.....each, $3.25

Halters and Ties—

Covert Mfg. Co.:
Web.....45&2%
Jute Rope.....40&5&5%
Sisal Rope.....30&5%
Covert's Saddlery Works:
Web and Leather Halters.....70%
Jute and Manila Rope Halters.....70%
Sisal Rope Halters.....60&20%
Jute Manila and Cotton Rope Ties..70%
Sisal Rope Ties.....60&10%

Hammers—

Handled Hammers—

Heller's Machinists'..40&10@40&10&10%
Heller's Farriers.....40&10@40&10&10%
Maydole Tack, Nos. 1, 2, 3, $1.25, $1.50, $1.....40@40&10&10%
Peck, Stow & Wilcox.....50%
Fayette R. Plumb:
Plumb, A. E. Nail.33⅓&7½@33⅓&10&7½%
Engineers' and B. S. Hand.....50&7½&5@50&10&7½&2½%
Machinists' Hammers.50&5@50&10&5%
Riveting and Tinners'.....40&2½@40&10&2½%
Sargent's C. S. New List.....40%

Heavy Hammers and Sledges—

3 lb. and under...lb 45c
3 to 5 lb.....lb. 36c } 75@5@75 &c10&5%
Over 5 lb.....lb. 30c
Wilkinson's Smiths'.....9½c@10c lb.

Handles—

Agricultural Tool Handles—

Axe, Pick, &c......45@50&5%
Hoe, Rake, &c......45@50&5%
Fork, Shovel, Spade, &c.:
Long Handles.....45@50&5%
D Handles.....40%

Cross-Cut Saw Handles—

Atkins'.....40&5%
Champion.....45@45&10%
Disston's.....50%

Mechanics' Tool Handles—

Auger, assorted.....*gro. $2.50@$2.75*
Brad Awl.....*gro. $1.65@$1.75*
Chisel Handles:
Apple Tanged Firmer, gro. ass'd. $2.50@$2.75; large, $3.25@$3.50
Hickory Tanged Firmer, gro. ass'd. $2.50@$2.75; large, $3.15@$3.25
Apple Socket Firmer, gro. ass'd, $2.25@$2.50; large, $3.00@$3.25
Hickory Socket Firmer, gro ass'd. $2.00 @ $2.25; large, $2.25 @ $2.50
Hickory Socket Framing, gro. ass'd, $3.00@$3.25; large, $3.25@$3.50
File, assorted.....*gro. $1.25@$1.35*
Hammer, Hatchet, Axe, &c......5%
Hand Saw, Varnished, doz. 60@70c
Not Varnished.....55@60c
Plane Handles:
Jack, doz. 25c; Jack Bolted..55@60c
Fore, doz. 35@38c; Fore, Bolted.. 70@75c
Chapin-Stephens Co.:
Carving Tool.....40@40&10%
Chisel.....5%@65&10%
File and Awl.....65@65&10%
Saw and Plane.....40@40&10%
Screw Driver.....40@40&10%
Millers Falls Adj. and Ratchet Auger Handles.....15&10%
Nicholson Simplicity File Handle, ₱ gro.....$0.85@$1.30

Hangers—

Barn Door, New Pattern, Round Groove, Regular:

Inch...	*3*	*4*	*5*	*6*	*8*
Single Doz.	$0.90	1.25	1.60	1.95	2.50

Barn Door, New England Pattern, Check Back, Regular:

Inch...	*3*	*4*	*5*	*6*
Single Doz.	$1.30	1.85	2.50	3.00

Allith Mfg. Co.
Reliable.....per doz. $15.00
Chicago Spring Butt Co.:
Friction.....25%
Oscillating.....25%
Big Twin.....35%
Chisholm & Moore Mfg. Co.:
Baggage Car Door.....50%
Elevator.....30%
Railroad.....50%
Cronk & Carrier Mfg. Co.:
Loose Axle.....60%
Roller Bearing.....60&10%
Lane Bros. Co.:
Parlor, Ball Bearing.....$4.15
Parlor, Standard.....$3.35
Parlor, New Model.....$2.85
Parlor New Champion.....$2.25
Barn Door, Standard.50&10&10&5%
Covered.....50&10&10%
Special.....50&10&10&5%
Lawrence Bros.:
Advance.....60%
Cleveland.....60&10%
Crown.....60%
Giant.....50&10%
New York.....60%
Peerless.....60&10%
Sterling.....60%
Swing, No. 95.....60%
Union, No. 44, $5.00; No. 45 $7.00; No. 46, $9.00.
McKinney Mfg. Co.:
No. 1, Special, $15.....60&10%
No. 2, Standard, $18.....60&10%
Hinged Hangers, $16.....50%
Meyers' Stayon Hangers.....60%
C. S. Smith Mfg. Co.:
Lundy Parlor Door.....50&10%
Monarch Barn Door.....60&10%
Never Jump Hinge.....50&10%
Peerless.....60&10%
Perfection.....70&5%
Phœnix.....70&5%
Wagner's Adjustable.....70&10%
Warehouse Anti-Friction.....60%
Richards Mfg. Co.:
Pioneer Wood Track No. 3.....$2.25
Imp'd Wood Track No. 5.....$2.25
Imp'd Steel Track No. 7.....$2.70
Imp'd Steel Track No. 7.....$2.65
Ball B'r'g Steel Track No. 9.....$2.50
Ball B'r'g Steel Track No. 10...$2.50
Roller B'r'g Steel Track No. 11...$2.45
Roller B'r'g Steel Track No. 12...$2.40
Ball B'r'g Steel Track No. 13..$2.75
Roller B'r'g Steel Track No. 14. $2.65
Ball B'r'g Trolley Track No. 15 ..40%
Ball Brg Trolley Track No. 19...40&5%
Ball Bearing Tandem Trolley Track No. 16.....40%
Silent Adjustable Track No. 18...40%
Auto Adjustable Track No. 22...40%
Trolley B. D. No. 17.....$1.60
Trolley F. D. No. 120.....$2.70
Trolley F. D. No. 121.....$2.85
Trolley F. D. No. 151.....$3.00
Roller Bearing D. D. No. 25....70&5
Roller Bearing U. S. B. D.....70&5%
Anti Friction B. D.....60&10%
Ives' Wood Track No. 1.....$2.15
Ives' Imp'd Wood Track No. 2..$2.15
Stowell Mfg. and Foundry Co.:
Acme Parlor Ball Bearing.....40%
Atlas.....60%
Badger Barn Door.....50%
Baggage Car Door.....50%
Climax Anti-Friction.....50%
Elevator.....40%
Express.....50%
Interstate.....60%
Lundy Parlor Door.....50%
Magic.....50%
Matchless.....60%
Nansen.....60&10%
Railroad.....50%
Street Car Door.....50%
Steel, Nos. 300, 400, 500.....40&15%
Stowell Parlor Door.....50%
Wild West, Nos. 300, 400, 500.....5%
Zenith for Wood Track.....50%
A. J. Swett Iron Works:
Eagle.....60&10%
Hylo.....50&10%
Perfection.....60%
Pilot.....60%
Taylor & Boggis Fy Cos.50&15&10&5%
Wilcox Mfg. Co.:
Bike Roller Bearing.....60&10%
C. J. Roller Bearing.....60&10%
Cycle Ball Bearing.....50%
Dwarf Ball Bearing.....40%
Ives, Wood Track.....60&10%
L. T. Roller Bearing.....60&10&5%
New Era Roller Bearing.....50&10%
O. K. Roller Bearing.....60&10&5%
Prindle, Wood Track.....60%
Richards' Wood Track.....60%
Richards' Steel Track.....50&10%
Spencer Roller Bearing.....60&10%
Tandem Nos. 1 and 2.....60%
Underwriters' Roller Bearing....40%
Velvet.....50%
Wilcox Auditorium Ball Bearing.30%
Wilcox Barn Trolley No. 123.....40%
Wilcox Elv. Door, Nos 112 and 122½.50%
Wilcox Elv. Door, No. 132.....30%
Wilcox Fire Trolley, Roller Bearing.....30%
Wilcox Le Roy Noiseless Ball Bearing.....40%
Wilcox New Century.....50&10&10%
Wilcox O. K. Steel Track.....50%
Wilcox O. K. Trolley.....50%
Wilcox Trolley Ball Bearing.....40%
Wilcox Wideman Narrow Gauge Ball Bearing.....40%
For Track, see *Rail.*
Extra 5@10% often given.

Hangers, Gate—

Myers' Patent Gate Hangers, ₱ doz., net, $4.50

Hasps—

McKinney's Perfect Hasp, ₱ doz.....50%

Hatchets—

Best Brands.....50@50&10%
Cheaper Brands.....60@60&10%
Note.—Net prices often made.

Hinges—

Blind and Shutter Hinges—

Surface Gravity Locking Blind: (Victor; National; 1868 O. P. Niagara; Clark's O. P.; Clark's Tip; Buffalo.)

No.....	*1*	*3*	*5*
Doz. pair.....	$0.85	1.75	3.50

Mortise Shutter: (L. & P., O. S., Dixie, &c.)

No.....	*1*	*1½*	*2*	*2½*
Doz. pair....	$0.70	.65	.60	.55

Mortise Reversible Shutter, (Buffalo, &c.)

No.....	*1*	*1½*	*2*
Doz. pair....	$0.75	.70	.65

North's Automatic Blind Fixtures, No. 2, for Wood, $9.00; No. 3, for Brick, $11.50.....10%
Parker.....70@75%
Reading's Gravity.....75&10%
Sargent's, Nos. 1, 3, 5, 11 & 13.....70&10@70&20%
Stanley's Steel Gravity Blind Hinges, ₱ doz. sets, without screws, $0.80; with screws, $1.15.
Wrightsville H'dware Co.:
O. S., Lull & Porter.....7 &5%
Acme, Lull & Porter.....15%
Queen City Reversible.....75%
Stenger's Positive Locking, Nos. 1 & 3.....70&10%
Shepard's Noiseless, Nos. 60, 65, 55.....70&10%
Niagara, Gravity Locking, Nos. 1, 3 & 5.....75%
1868, Old Pat'n, Nos. 1, 3 & 5.....5%
Tip Pat'n, Nos. 1, 3& 5.....5%
Buffalo Gravity Locking, Nos. 1, 3 & 5.....75%
Shepard's Double Locking, Nos. 20 & 25.....70%
Champion Gravity Locking, No. 75..75%
Steamboat Gravity Locking, No. 10..75%
Pioneer, Nos. 060, 45 & 5½.....75%
Empire, Nos. 101 & 103.....70%
W. H. Co.'s Mortise Gravity Locking, No. 2.....60%

Gate Hinges—

Clark's or Shepard's—Doz. sets:

No.....	*1*	*2*	*3*
Hinges with Latches..	$2.00	2.70	5.00
Hinges only.....	$1.40	2.05	3.80
Latches only.....	.70	.70	.25

New England:
With Latch.....doz. ....@$2.00
Without Latch.....doz. ....@$1.60
Reversible Self-Closing:
With Latch.....doz. ....@$1.75
Without Latch.....doz. ....@$1.35
Western:
With Latch.....doz. $1.75
Without Latch.....doz. $1.15
Wrightsville H'dware Co.:
Shepard's or Clark's, doz. sets,

No.....*	*1*	*2*	*3*
Hinges with Latches..	$2.00	2.70	5.00
Hinges only.....	1.40	2.05	3.80
Latches only.....	.70	.70	1.35

Spring Hinges—

Holdback, Cast Iron.....*gro. $9.00*
Non-Holdback, Cast Iron...*gro. $8.00*
J. Bardsley
Bardsley's Non-Checking Mortise Floor Hinges.....45%
Bardsley's Patent Checking.....15%
Bommer Bros.:
Bommer Ball Bring Floor Hinges40%
Bommer Spring Hinges.....40%
Chicago Spring Butt Co.:
Chicago Spring Hinges.....25%
Triple End Spring Hinges.....50%
Chicago (Ball Bearing) Floor Hinge.....50%
Garden City Engine House.....25%
Keene's Saloon Door.....35%
Columbian Hdw. Co.:
Acme, Wrt. Steel.....30%
Acme, Brass.....30%
American.....30%
Columbia, No. 14.....₱ gr. $9.00
Columbia, No. 18.....₱ gr. $25.00
Columbia, Adjustable, No. 7, ₱ gr. $12.00
Gem, new list.....30%
Clover Leaf.....₱ gr. $12.50
Oxford, new list.....30%
Hoffman Hinge & Foundry Co.:
No. 70 & 80 Holdback Detachable10.50
Lawson Mfg. Co.:
Matchless.....35%
Matchless Pivot.....45%
Shelby Spring Hinge Co.:
Crown Jamb Hinge.....40%
Chief Ball Bearing Floor Hinge.45%
Royal Ball Bearing Floor Hinge..45%
The Stover Mfg. Co.:
Ideal, No. 16, Detachable, ₱ gr $12.50
Ideal, No. 4.....₱ gr. $9.00
New Idea No. 1.....₱ gr. $9.00
New Idea, Double Acting.....45%
Extra 10% often given on most of these Hinges.

Wrought Iron Hinges—

Strap and T Hinges, &c., list Mar. 15, 1901:
Light Strap Hinges.....80&10&5%
Heavy Strap Hinges 80&20&10%
Light T Hinges.....75&10&5%
Heavy T Hinges.....75&5%
Extra Heavy T Hinges..80&20%
Hinge Hasps.....70%
Cor. Heavy Strap....80&20&10%
Cor. Ex. Heavy T.....80&20%
Ex. 10@10&10%

Screw Hook and Strap. { *6 to 12 in*.....*lb. 3½c* / *14 to 20 in*.....*lb. 3¼c* / *22 to 36 in*.....*lb. 3 c*

Screw Hook and Eye:
¾ to 1 inch.....*lb. 6 c*
⅝-inch.....*lb. 7 c*
½-inch.....*lb. 9 c*

Miscellaneous—

Hoffman's Steel Spring Butt Hinges.....40&10%
Hoffman's Offset Refrigerator Hinges..40&10%

Hitchers, Stall—

Covert Mfg. Co., Stall Hitchers.....35%

Hods, Coal—

Inch.....	*15*	*16*	*17*	*18*
Galv. Open..	$2.50	2.75	3.00	3.25 ₱ doz.
Jap. Open...	$2.00	2.25	2.50	2.75 ₱ doz.
Galv. Funnel.	$3.00	3.25	3.50	3.75 ₱ doz.
Jap. Funnel.	$2.50	2.75	3.00	3.25 ₱ doz.

Masons, Etc.—

Cleveland Wire Spring Co.:
Steel Mortar.....each $1.45
Steel Brick.....each $1.10
Hoffman's:
Brick.....each $1.10
Masons'.....each $2.00
Plasterers'.....each $3.20

Hoes— Eye—

Scovil and Oval Pattern.....60&10@60&10&10%
Grub, list Feb. 23, 1899.....60&10@60&10&5%

Handled—

Aug. 1, 1899, List:
Garden.....70&10%
*Meadow & Rhode Island*75&2½%
Southern Meadow...75&5&2½%
Mortar and Street.....75&7½%
Planters', Regular Pat'n.70&30%
Cotton.....75&7½%
Toy, Ladies', Boys', Onion, Turnip, Berry or Tobacco.70&10&5%
Extra 30%
Note.—Manufacturers and jobbers use a diversity of lists, and often sell at net prices.
Ft. Madison Cotton Hoe.....75&7½%
Ft. Madison Crescent Cultivator Hoe, per doz.....75&10%
Ft. Madison Mattock Hoes:
Regular Weight.....₱ doz. $5.00
Junior Size.....₱ doz. $4.00
Ft. Madison Sprouting Hoe, ₱ doz. $4.60
Ft. Madison Dixie Tobacco Hoe..75&20%
Kretsinger's Cut Away.....70&10%
Warren Hoe.....60%
W. & C. Ivanhoe.....75&2%
B. B. Cultivator Hoe.....75&10&2%
Acme Weeding.....75&10&2%
W. & C. Lightning Shuffle Hoe, ₱ doz. $4.85

Hoisting Apparatus—

See *Machines, Hoisting.*

Holders— Bit—

Angular, ₱ doz. $34.00.....45&10%

Door—

Empire.....50%
Bardsley's.....45%

File and Tool—

Nicholson File Holders and File Handles.....33⅓%

Hooks— Cast Iron—

Bird Cage, Reading.....60%
Bird Cage, Sargent's List.....60%
Ceiling, Sargent's List.....40&10%
Clothes Line, Hoffman's.....40&10%
Clothes Line, Reading List 65&10@65&10&10%
Clothes Line, Sargent's List. 50&20&10%
Coat and Hat, Sargent's List.....45&10%
Clothes Line, Stowell's.....70%
Coat and Hat, Stowell's.....70%
Coat and Hat, Reading.....70&75%
Coat and Hat, Wrightsville.....65%
Harness, Hoffman.....per doz. 35&40¢
Harness, Reading List.....70&10@75%

Wire—

Bell.....80@80&5%
Wire C. & H. Hooks.....70@70&5%
Atlas, Coat and Hat:
Single Cases.....70%
10 Case Lots.....70&10%
Czar Harness.....50&10&5%

Wire Coat and Hat:
Acme.....60%
B. B.....60%
V Brace, Chief and Czar.....60%
Gem.....60&10%
Bright Wire Goods—See *Wire.*

Wrought Iron—

Box, 6 in., per doz. $1.00; 8 in., $1.25; 10 in., $2.50.
Cotton.....doz. $1.05@1.25
Wrought Staples, Hooks, &c.—See *Wrought Goods.*

Miscellaneous—

Bush, Light, doz. $5.50; Medium, $6.00; Heavy, $6.50
Grass.....Nos. 1 2 3 4
Best.....$1.50 1.75 2.00
Common.. $1.30 1.50 1.50 1.60
Potato and Manure.....66⅔&20%
Whiffletree.....lb. 5¾@6c
Hooks and Eyes:
Brass.....60&10&10@70%
Malleable Iron.....70&5@70&10%
Covert Saddlery Works' Self Locking Gate and Door Hook.....60%
Ft. Madison Cut-Easy Corn Hooks, ₱ doz. $5.25 net
Bench Hooks—See *Bench Stops.*
Corn Hooks—*See Knives, Corn.*

Horse Nails—See *Nails, Horse*

Horseshoes—

See *Shoes, Horse.*

Hose Rubber—

Garden Hose, ¾-inch:
Competition.....ft. 4½@ 5 c
3-ply Standard.....ft. 6½@ 7 c
4-ply Standard.....ft. 7½@ 8 c
3-ply extra.....ft. 8½@ 9 c
4-ply extra.....ft. 10 @10½c
Cotton Garden, ¾-in., coupled:
Low Grade.....ft. 6 @7 c
Fair quality.....ft. 8 @9 c

Irons— Sad—

From 4 to 10.....lb 3@3¼c
B. B. Sad Irons.....lb. 3@3¼c
Chinese Laundry.....lb. 4¾@5c
Chinese Sad.....lb. 3¾@4c
Mrs. Potts', per set:
Nos..... 50 55 60 65
Jap'd Tops....74c 71c 84c 81c
Tin'd Tops....77c 74c 87c 84c
New England Pressing, lb.. 3¼@3¾c

Pinking—

Pinking Irons.....doz. 50@60c

Soldering—

Soldering Coppers 2½ and 3..20@21c
1¼ and 2.....22@23c

Jacks, Wagon—

Covert Mfg. Co.:
Auto Screw.....30&5%
Steel.....45&2%
Covert's Saddlery Works':
Daisy.....60&10%
Victor.....60&10%
Lockport.....50%
Lane's Steel.....30&10%

Kettles—

Brass, Spun, Plain.....20@25%
Enameled and Cast Iron—See *Ware, Hollow.*

Knives—

Butcher, Kitchen, &c.—

Foster Bros.' Butcher, &c.....30%
Smith & Hemenway Co.....40&10%
Wilkinson Shear & Cutlery Co.....50%
Hay and Straw—See *Hay Knives.*

Corn—

Withington Acme, ₱ doz., $2.65; Dent, $2.75; Adj. Serrated, $2.20; Serrated, $2.10; Yankee No. 1, $1.50; Yankee No. 2, $1.15.

Drawing—

Standard List.....70&5@70&10%
Bradley's.....
C. E. Jennings & Co. Nos. 45, 46..60&10%
Jennings & Griffin. Nos. 51, 52..60&10&10%
Swan's.....70&10&2½%
Watrous.....16⅔&10%
L. & I. J. White.....20&5@25%

Hay and Straw—

Lightning.....₱ doz. $6.50@7.00
Iwan's Sickle Edge.....₱ doz. $10.00
Iwan's Serrated.....₱ doz. $10.00
Maine.....₱ doz. $8.50

Mincing—

Buffalo.....₱ gro. $13.00

Miscellaneous—

Farriers'.....doz. $3.00@3.25
Wostenholm's.....₱ doz. $3.00@3.25

Knobs—

Base, 2¼-inch, Birch, or Maple, Rubber tip, gro.....$1.10@1.15
Carriage, Jap, all sizes..gro. 40@45c
Door, Mineral.....doz. 65@70c
Door, Por. Jap'd.....doz. 70@75c
Door, Por. Nickel....doz. $2.05@2.15
Bardsley's Wood Door, Shutter, &c...15%
Picture, Sargent's.....60&10%

Lacing Leather—

See *Belting Leather—*

Ladders, Step, Etc.—

Lane's Store.....25%
Myers Noiseless Store Ladders.....50%

Ladies— Melting—

L. & G. Mfg. Co, Low List.....25%
P. S. & W.....50%
Reading.....60%
Sargent's.....45&10%

Lanterns— Tubular—

Regular Tubular No. 0. doz. $4.35@4.75
Lift Tubular..No. 0..doz. $4.75@5.25
Hinge Tubular..No. 0,..doz. $4.75@5.25
Other Styles.....10@10&10@10&5%

Bull's Eye Police—

No. 1, 2¾ inch.....$2.50@2.75
No. 2, 3 inch.....$2.75@3.00

Latches— Gate—

Hoffman's Safety Gate.....₱ doz. 60c

Thumb—

Roggin's Latches, with screw..dz35@40c

Leaders, Castle—

Small.....doz. 55c; large, 60c
Covert Mfg. Co.....45&2%

Lifters, Transom—

R & E.....33⅓%

Lines—

Wire Clothes, Nos...	*18*	*19*	*20*
100 feet.....	*$2.20*	*2.00*	*1.65*
75 feet.....	*$1.80*	*1.70*	*1.30*

Samson Cordage Works:
Solid Braided Chalk, No. 0 to 3.....40%
Silver Lake Braided Chalk, No. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50
₱ gr.....30%
Anniston Waterproof Clothes, 50 lt., ₱ gro.: $24.00; Gilt Edge, $22.00; Air Line, $23.00; Acme, $17.00; Alabama, $16.00; Empire, $17.00. Advance, $14.00; Alliston, $13.00; Calhoun, $11.00; Oriole, $20.00; Albermarle, $13.50; Eclipse, $12.50; Chicago, $11.00; Standard, $10.00; Columbia, $9.00.

Locks— Cabinet—

Cabinet Locks.....33⅓&33⅓&7⅓%

Door Locks, Latches, &c.—

[Net prices are very often made on these goods.]
Reading Hardware Co.....50%
R. & E. Mfg. Co.....40%
Sargent & Co.....40@40&10%

Elevator—

Stowell's.....40%

Padlocks—

Wrought Iron.....75&10&5@80&5%
R. & E. Mfg. Co. Wrt. Steel and Brass.. 75@75&10%

Sash, &c.—

Ives' Patent.:
Bronze and Brass.....62½%
Crescent.....50%
Iron.....62½%
Wrought Bronze and Brass.....55%
Wrought Steel.....55%
Reading.....60&10&10@70%

Machines— Boring—

Com., Upright, Without Augers..$2.00
Com., Angular, Without Augers..$2.25
Without Augers.

R. & E. Mfg. Co.:	Upright.	Angular.
Improved No. 3.	$4.25	No. 1 $5.00
Improved No. 4.	3.75	No. 2. 3.38
Improved No. 5.	2.75	
Jennings'...No. 4,	3.15	No. 1, 3.50
Millers' Falls.....		5.75
Snell's, Rice's Pat.	2.50	2.75

Fence—

Williams' Fence Machines.....each, $5.50

Hoisting—

Moore's Anti-Friction Differential Pulley Block.....30%
Moore's Hand Hoist, with Lock Brake.20%

Ice Cutting—

Chandler's.....15&10%

Washing—

Boss Washing Machine Co.:	Per doz.
Boss No. 1; Boss Rotary.....	$57.00
Boss No. 7; Dietz Rotary.....	60.00
Champion Rotary; Banner No. 1..	54.00
Standard Champion No. 1.....	48.00
Standard Perfection.....	36.00
Clothl Square Wester.....	30.00
Uneeda American, Round.....	29.00

Mallets—

Hickory.....45&5@50%
Lignumvitæ.....45&5@50%
Tinners', Hickory and Applewood, doz.....50@55c

Mats— Door—

Elastic Steel (W. G. Co.).....10%

Mattocks—

See *Picks and Mattocks.*

Menders, Hose

Robinson's Hose Menders.....₱ gro, $2.00

Milk Cans—See *Cans, Milk*

Mills— Coffee, etc.—

Enterprise Mfg. Co.....25@30%
Hoffman's Side, Coffee and Spice.....₱ doz. $1.25
National, list Jan. 1, '94.....30%
Parker's Columbia & Victoria.50&10@60%
Parker's Box and Side.....50&10@60%
Sun, No. 108, 1 ℔ mill.....₱ doz. $8.00
Swift, Lane Bros Co.....30%

Mowers, Lawn—

Net prices are generally quoted.
Cheap.....all sizes. $1.90@1.95
Good.....all sizes, $2.25@2.50

	10	*12*	*14*	*16-inch*
High Grade	*4.25*	*4.50*	*4.75*	*5.00*

Continental.....60&5%
Great American.....70%
Great American Ball Bearing, new list.70%
Quaker City.....70%
Pennsylvania.....50&5%
Pennsylvania, Jr., Ball Bearing.....60%
Pennsylvania Golf.....50%
Pennsylvania Horse.....40%
Pennsylvania Pony.....45%
Philadelphia:
Styles M., S., C., K., T.....70&10%
Style A, all Steel.....65&10%
Style E, High Wheel.....70&10&5%
Drexel and Gold Coin, low list...50&5%

Nails—

Cut and Wire. See Trade Report.
Wire Nails and Brads, Papered. List July 20, 1899.....85@85&10%
Hungarian, Finishing, Upholsterers', &c. See Tacks.

Horse—

Nos.	6	7	8	9	10	
A. C.	25c	23c	22c	21c	21c	40&5%
Ausable	28c	26c	25c	24c	23c	50&10%
C. B. K.	25c	25c	22c	21c	21c	40%
Champi'n	28c	26c	25c	24c	23c	40&10&5%
Clinton	19c	17c	16c	15c	14c	30&10&5%
Maud S.	25c	23c	22c	21c	21c	50%
Putnam	23c	21c	20c	19c	18c	33⅓%
Putnam						
Cold Rol'd	19c	18c	17c	16c	.. ..	10&10%
American, Nos. 5 to 10						9@9¼c
Neponset	Nos. 5 to 10c					₱ ℔ 12c
Crown Picture Nails						₱ gro. $1.50

Picture

	1½	*2*	*2½*	*3*	*3½ in.*
Brass Head.	*.45*	*.60*	*.70*	*.95*	*1.00 gro.*
Por. Head...	..	*1.10*	*1.10*	*1.10*	*.. gro.*

Crown Picture Nails.....₱ gro. $1.50

Nippers, See *Pliers and Nippers.*

Nuts—

Cold Punched: Off list.
Mfrs. or U. S. Standard.
Square, plain.....$4.50
Hexagon, plain.....$4.60
Square, C. T. & R.....$4.70
Hexagon, C. T. & R.....$5.00
Hot Pressed:
Mfrs., U. S. or Nar. Gauge Stan'd.
Square Blank.....$4.80@5.00
Hexagon Blank.....$5.00@5.30
Square Tapped.....$4.60@4.80
Hexagon Tapped.....$4.80@5.10

Oakum—

Best or Government.....lb. 6¼c
Navy.....lb. 4¾c
U. S. Navy.....lb. 5¾c
Plumbers' Spun Oakum.....8¾c
In carload lots ¼c lb. off f.o.b. New York.

Oil Tanks—See *Tanks, Oil.*

Oilers—

Brass and Copper.....65@65&10%
Tin or Steel.....70&10@75%
Zinc.....75@75&10%
Chase or Paragon:
Brass and Copper.....45&10@50%
Tin or Steel.....75@75&10%
Zinc.....60@60&10%
Malleable, Hammers' Improved, No. 1 $3.60; No. 2, $4; No. 3, $4.40 ₱ doz. 20%
Malleable, Hammers' Old Pattern, same list.....50&10%
American Tube & Stamping Co.:
Spring Bottom Cans.....70@70&10%
Railroad Oilers etc.....60@60&10%

Openers— Can—

French.....doz. 55c
Iron Handle.....doz. 25@27c
Sprague, Iron Hdle..per doz. 35@40c
Sardine Scissors...doz. $1.75@3.00
Marvel.....per doz. $1.25
National.....50%
Stowell's.....per doz. 35@45c
Tip Top.....per doz. $0.75

Egg—

Nickel Plate.....per doz., $2.00
Silver Plate.....per doz., $4.00

Packing—

Asbestos Packing, Wick and Rope, 15@15½c lb.

Rubber—

Sheet, C. I.....8@12c
Sheet, C. O. S.....9@13c
Sheet, C. B. S.....10@14c
Sheet, Pure Gum.....50@70c
Sheet, Red.....35@40c
Jenkins' Standard, ₱ ℔ 80c...25@25&5%

Miscellaneous—

American Packing.....7@10c lb.
Cotton Packing.....14@16c lb.
Italian Packing.....9@12½c lb.
Jute.....4c lb.
Russia Packing.....7@11c lb.

Pails— Creamery

S. S. & Co., with gauges.. No 1 $6.25; No. 2, $5.50 ₱ doz.

Galvanized—

Price per doz.

Quart.....	*10*	*12*	*14*
Water, Regular..	*1.50*	*1.75*	*2.00*
Water, Heavy....	*2.75*	*3.00*	*3.25*
Fire, Rd. Bottom.	*2.30*	*2.60*	*2.80*
Well.....	*2.25*	*2.50*	*2.75*

Pans— Dripping—

Standard List.....60&5@60&10%

Fry—

Common Lipped:

No.	*1*	*2*	*3*	*4*	*5*
Per doz.	*$0.95*	*1.05*	*1.15*	*1.30*	*1.65*

Roasting and Baking—

Regal, S. S. & Co., ₱ doz., Nos. 5, $4.50; 10 $5.25; 20, $5.75; 30, $6.25.
Simplex, ₱ doz.:

No.	40	50	60	140	150	160
	$2.75	3.25	3.75	3.00	3.25	4.00

Paper—Building Paper—

Asbestos: *lb.*
Building Felt.....2¾c
Mill Board, sheet, 40 x 40 inches 3½c
Mill Board, roll, thicker than 1-16 inch.....3¼c
Mill Board, roll, 1-16 in. thick and less.....2½c
Per roll
Rosin Sized Sheathing: 500 sq. ft.
Light wt., 25 lbs. to roll..$0.43@0.50
Medium wt., 30 lbs. to roll..$0.48@0.55
Heavy wt., 40 lbs. to roll..$0.68@0.75
Black Water Proof Sheathing, 500 Sq ft, 1 ply, 65c; 2 ply, 85c; 3 ply, $1.10; 4 ply, $1.25.
Deafening Felt, 9, 6 and 4½ sq. ft. to lb., ton.....$45.00
Red Rope Roofing, 250 sq. feet per roll.....$1.65
NOTE.—*These goods are often sold at delivered prices.*

Tarred Paper.

1 ply (roll 500 sq. ft.), ton..$35 50@37.00
2 ply, roll 108 sq. ft.....60@65c
3 ply, roll 108 sq. ft.....85@90c
Slater's Felt (roll 500 sq. ft.).....75c
NOTE.—*Above prices often include delivery.*
R. R. M. Stone Surfaced Roofing (roll 110 sq. ft.).....$2.75

Sand and Emery—

Flint.....60@60&10%
Garnet.....25@20@15%

Parers— Apple—

Advance.....	₱ doz.	$4.50
Baldwin.....	₱ doz.	$5.00
Bonanza Improved.....	each	$0.50
Dandy.....	each	$7.50
Eureka Improved.....	each	$0.00
Family Bay State.....	₱ doz.	$6.00
Improved Bay State.....	₱ doz.	$6.00
New Lightning.....	₱ doz.	$7.50
Reading 72.....	₱ doz.	$4.00
Reading 78.....	₱ doz.	$7.00
Turn Table '98.....	₱ doz.	$6.75
White Mountain.....	₱ doz.	$6.00

Potato—

Saratoga.....₱ doz. $7.00
White Mountain.....₱ doz. $6 00

Picks and Mattocks—

List Feb. 23, 1899...60&10@60&10&10%

Pinking Irons—

See *Irons, Pinking.*

Pins— Escutcheon—

Brass.....60@60&10%
Iron, list Nov. 11, '85.....60@60&10%

Pipe, Cast Iron Soil—

Standard, 2-6 in.....50&10%
Extra Heavy, 2-6 in.....65%
Fittings.....70%

Pipe, Merchant,

Steel or Iron, Carload Lots, f.o.b. Pittsburgh.

Merchant Pipe.	*Black.*	*Galvanized.*
⅛, ¼, ⅜ inch.....	*68%*	*58%*
½ inch.....	*70%*	*60%*
¾ to 6 inch...	*75%*	*65%*
7 to 12 inch.....	*65%*	*50%*

Less than carloads, 12½% advance.

Pipe Sewer—

Jobbers' Prices—
Standard Pipe and Fittings, 2 to 24 in.
New England.....70%
New York and New Jersey.....75%
Maryland, Delaware, East Penn.75%
West Penn and West Va.....70%
Virginia.....75%
Ohio, Michigan and Ky.....75%
Carload lots are generally delivered.

Pipe, Stove—

Edwards' Nested Stove Pipe:

	C. L.	L. C. L.
5 in., per 100 joints....	$7.50	$8.50
6 in., per 100 joints....	8.00	9.00
7 in., per 100 joints....	9.00	10.00

Planes and Plane Irons—

Wood Planes—

Bench, First quality....40&5@40&10%
Bench, Second qual....50&5@50&10%
Molding.....33⅓&5@33⅓&10%
Bailey's (Stanley R. & L. Co)
5&10@25&10&10%
Chapin-Stephens Co.:
Bench, First Quality.....40@40&10%
Bench, Second Quality.....50@50&10%
Molding.....33⅓@33⅓&10%
Toy and German.....40@40&10%
Gage Self Setting.....35%
Union.....60%

Iron Planes—

Bailey's (Stanley R. & L. Co).....25&10@25&10&10%
Chaplin's Iron Planes.....50&10%
Miscellaneous Planes (Stanley R. & L. Co.).....20&10@20&10&10%
Sargent's.....60%
Union.....60%

Plane Irons—

Wood Bench Plane Irons.....30&5@30&10%
Buck Bros.....30%
Chapin-Stephens Co.....30@30&10%
Stanley R. & L. Co...20&10@20&10&10%
L. & I. J. White.....20&5@25%

Planters, Corn, Hand.

Kohler's Eclipse.....₱ doz. $8.50

Plates—

Felloe.....lb. 3½@4c
Self-Sealing Pie Plates (S. S. & Co.), ₱ doz. $2.00.....50%

Pliers and Nippers—

Button Pliers.....75@75&10%
Gas Burner, per doz., 5 in., $1.15@ $1.20; 6 in., $1.35@$1.45
Gas Pipe.. 7 8 10 12-in.
$1.75 $2.00 $2.75 $3.75
Acme Nippers.....50@50&5%
Bernard's:
Parallel, Pliers.....35%
Paragon Pliers.....50&5%
Lodi Pliers.....50&5%
Elm City Fence Pliers.....35%
Cronk & Carrier Mfg. Co.:
American Button.....75&10%
Cronk's.....60%
Improved Button.....70&10%
Stub's Pattern.....50%
Combination and others.....33⅓%
Heller's Farriers' Nippers, Pincers, and Tools 40&10@40&10&10%
P., S. & W. Tinners' Cutting Nippers.....30&5&10%
Swedish Side, End and Diagonal Cutting Pliers.....50%
Utica Drop Forge & Tool Co.:
Pliers and Nippers, all kinds.....40%

Plumbs and Levels—

Chapin Stephens Co.:
Plumbs and Levels.....30@30&10&10%
Chapin's Imp. Brass Cor 40&10&10%
Pocket Levels.....30@30&10&10%
Level Glasses.....60@60&10&10%
Disston's Plumbs and Levels.....70%
Disston's Pocket Levels.....50&10%
C. E. Jennings & Co.'s Iron.....
C. E. Jennings & Co.'s Iron, Adjustable.....&10%
Stanley R. & L. Co....30&10@30&10&10%

Stanley's Duplex.....20@20&10&10%
Woods Extension.....33⅓&5

Poachers, Egg—

Buffalo Steam Egg Poachers, ₱ doz. No. 1, $4.00; No. 2, $ .00; No. 3, $ .00; No. 4, $12.00.... .....; 50%

Points, Glaziers'—

Bulk and 1 lb. papers.. lb. 8¾c@..
½-lb. papers..... lb. 9¼c@..
¼-lb. papers..... lb. 9½c@..

Pokes, Animal—

Ft. Madison Hawkeye.....₱ doz. $3.25
Ft. Madison Western.....₱ doz. $4.00

Police Goods—

Manufacturers' Lists.....25@25&5%
Tower's..... .....25%

Polish—Metal—

Prestoline Liquid, No. 1 (½ pt.), ₱ doz. $3.00; No. 2 (1 qt.), $9.72.....40%
Prestoline Paste.....40&10%
George William Hoffman:
U. S. Metal Polish Paste, 3 oz. boxes, ₱ doz. 50¢; ₱ gr. $4.50; ½ lb boxes, ₱ doz. $1.25; 1 lb boxes, ₱ doz. $2.25.
U. S. Liquid, 8 oz. cans, ₱ doz. $1.35; ₱ gr. $12.00.
Barkeepers' Friend Metal Polish, ₱ doz. $1.75; ₱ gr. $18.00.
Wynn's White Silk, ½ pt. cans, ₱ doz.....$2.00

Stove—

Black Eagle Benzine Paste, 5 lb cans ..., ₱ lb 10¢
Black Eagle, Liquid, ½ pt. cans ₱ doz. 7.2¢
Black Jack Paste, ¾ lb cans, ₱ gro. $9.00
Ladd's Black Beauty, gr. $10.00.....50%
Joseph Dixon's, ₱ gr. $5.75.....10%
Dixon's Plumbago.....₱ lb 8¢
Fireside.....₱ gr. $2.50
Gem, ₱ gr. $4.50.....10%
Japanese.....₱ gr. $3.50
Jet Black.....₱ gr. $3.50
Peerless Iron Enamel, ½ pt. cans..... ₱ doz. $1.50
Wynn's:
Black Silk, 5 lb pail.....each 70¢
Black Silk, ½ lb box.....₱ doz. $1.00
Black Silk, 5 oz. box.....₱ doz. $0.75
Black Silk, ½ pt. liq.....₱ doz. $1.00

Poppers, Corn—

1 qt., Square.....gro. $9.00
1 qt., Round .....gro. $10.00
1½ qt. Square.....gro. 11.00
2 qt., Square.....gro. 13.00

Post Hole and Tree Augers and Diggers—

see also *Diggers, Post Hole, &c.*

Posts, Steel—

Steel Fence Posts, each, 5 ft., 42¢; 6 ft., 46¢; 6½ ft., 48¢.
Steel Hitching Posts, each.....$1.30

Potato Parers—

See *Parers, Potato.*

Pots— Glue—

Enameled.....40%
Tinned.....35%

Powder—

In Canisters:
Duck, 1 lb. each.....15c
Fine Sporting, 1 lb. each.....75c
Rifle, ½-lb. each.....15c
Rifle, 1-lb. each.....25c
King's Semi-Smokeless:
Keg (25 lb bulk).....$6.50
Half Keg (12½ lb bulk).....$3.50
Quarter Keg (6¼ lb bulk).....$1.90
Case 24 (1 lb cans bulk).....$8.50
Half case (1 lb cans bulk).....$4.50

King's Smokeless:	Shot Gun	Rifle
Keg (25 lb bulk).....	$12.00	$15.00
Half Keg (12½ lb bulk)	6.25	7.75
Quarter Keg (6¼ lb bulk)	3.25	4.00
Case 24 (1 lb cans bulk)	14.00	17.00
Half case 12 (1 lb cans bulk)	7.25	8.75

Robin Hood Shot Gun.....50&20%

Presses—

Fruit and Jelly—

Enterprise Mfg. Co.....20@25%
Sensible.....33⅓&5
2 qt., $2.00; 4 qt., $4.00; 10 qt., $6.00 each.

Seal Presses—

Morrill's No. 1, per doz. $20.00.....50%

Pruning Hooks and Shears—See *Shears.*

Pullers Nail—

Cyclops.....50%
Daisy Improved Nail Puller.....50%
Miller's Falls, No. 3, per doz. $12.00..... 33⅓&5%
Pearson No. 1, Cyclone Spike Puller, each $8.00.....50%
Pelican, ₱ doz. $9.00.....40&10%
Scranton Case Lots:
No. 1 (large), ₱ doz. $6.50; No. 2 (large), $5.75; No. 3 (small), $5.00; No. 2-B (large), $5.50; No. 3-B (small), $5.00; No. 2-D (large), $4.50; No. 3-D (small) $4.00.
Smith & Hemenway Co.:
Ajax.....60%
Diamond B, No. 2, case lots, ₱ doz $6.00
Diamond B, No. 3, case lots, ₱ doz $5.50
Eureka.....50%
Giant, No. 1, ₱ doz. $18; No. 2, $16.50; No. 3, $15.....40%
Yankee.....66⅔&5

Pulleys—Single Wheel—

Inch.....	2	2½	3
Awning...doz	$0.55	.85	1.15

Hay Fork, Swivel or Solid Eye.....
doz., 4 in., $1.15; 5 in., $1.40

Inch.....	2	2¼	2½
Hot House..doz	$0.70	.90	1.25
Inch.....	1¼	1½	1¾ 2
Screw.....doz	$0.16	.19	.23 .30
Inch.....	1¼	2	2¼ 2½
Side.....doz	$0.30	.40	.55 .63
Inch.....	1½	1¾	2 2½
Tackle...doz	$0.30	.42	.53 1.00

Stowell's:
Ceiling or End, Anti-Friction.....60%
Dumb Waiter, Anti-Friction...60&10%
Hay Fork, Anti-Fricton, 5-in. Wheel, ₱ doz. $12.00..... .....50%
Electric Light.....60%
Side, Anti-Friction.....60&10%

Sash Pulleys—

Common Frame; Square or Round End, per doz., 1¾ and 2 in..16@19c
Auger Mortise, no Face Plate, per doz. 1¾ and 2 in.....16@19c
Auger Mortise, with Face Plate, per doz., 1¾ and 2 in.....16@19c
Acme.....1¾ in.. 16¢; 2 in.. 19¢
Common Sense, 1¾ in.... ₱ doz., 18¢; 2 in., 20¢.
Fox-All-Steel, Nos. 3 and 7, 2 in. ₱ doz 50%
Grand Rapids All Steel Noiseless.....50%
Ideal No. 13.....1¾ in.. ₱ doz.. 16¢
Niagara.....1¾ in.. 16¢; 2 in.. 19¢
No. 26, Troy....1¾ in., 14½¢; 2 in.. 16½¢
Star.....1¾ in.. 16¢; 2 in., 19¢
Tackle Blocks—See *Blocks.*

Pumps—

Cistern.....60@60&10%
Pitcher Spout.....75&10@80%
Wood.....50@50&10%
Pump Leathers. Lower and Plunger Valves—Per gro.:

Inch..	2	2¼	2½	2¾
	$2.20	*2.50*	*2.75*	*3.00*
Inch..	*3*	*3¼*	*3½*	*3¾* 4
	$3.30	*3.60*	*3.85*	*4.10* *4.40*

Barnes Dbl. Acting (low list).....50%
Contractors' Rubber Diaphragm No. 2 R. & L. Block Co.....$16.00
Daisy Spray Pump.....₱ doz. $7.20
Flint & Walling's Fast Mail (low list).80%
Flint & Walling's Pitcher Spout.....0%
Loud's Suction Pumps, U. S. Co.....20%
Mechanical Sprayer.....$7.20
Myer's Pumps, low list.....50%
Myers' Power Pumps.....50%
Myers' Spray Pumps.....50%

Punches—

Saddlers' or Drive, good..doz. 65@70c
Spring, single tube, good quality... $1.75@2.00
Revolving (4 tubes)...doz. $3.75@4.00
Bemis & Call Co.'s Cast Steel Drive.....50%
Bemis & Call Co.'s Check.....55%
Morrill's No. 1 (A.B.C.).₱doz., $15.00 ..50%
No. 2, ₱ doz. $22.50.....50%
Hercules, each $7.50.....50%
Niagara Hollow Punches.....40%
Niagara Solid Punches.....55&10%
Steel Screw, B & K. Mfg. Co.....40%
Tinners' Hollow, P., S. & W. Co.35@35&5%
Tinners' Solid, P., S. & W. Co., ₱ doz., $1.44.....60%

Rail— Barn Door, &c.—

Cast Iron, Barn Door: Flange Screw Holes for Rd. Groove Wheels:

½	⅝	¾	In.
$1.70	$2.10	$2.50	100 feet.

Angular for Sq. Groove Wheels:

Small	*Med.*	*Large.*	
$1.00	*1.95*	*2.70*	*100 feet.*

Sliding Door, Brnzed Wr't Iron, ft. 6½c
Sliding Door, Iron Painted....2½@3c
Sliding Door, Wrought Brass, 1¼ in.....lb. 36c...30%
Allith Mfg. Co. Reliable Hanger Track ₱ foot.....10¢
Cronk's Double Braced Steel Rail, ₱ foot.....3½¢
Cronk's O. N. T. Rail.....3½¢
Lanes' O. N. T., ₱ 100 ft., 1 inch, $3.10; 1¼ inch, $3.90; 1½ inch, $4.85.
Lanes' Standard, ₱ 100 ft.....3.75
Lawrence Bros., ₱ ft. 11¢.....60%
Lawrence Bros. New York.....3½¢
McKinney's Hinged Hanger Rail ₱ foot, 11¢.....50%
McKinney's None Better.....₱ ft. 3½¢
McKinney's Standard.....₱ ft. 4 ¢
Myers' Stayon Track.....50&10%
Smith's Wrought Bracket, Plain.....3½¢
Smith's Special.....4½¢
Smith's Never Jump, per ft. 11¢.....50%
Smith's Plain Steel.....30%
Smith's Milled Steel.....4½¢
Stowell's Cast Rail.....11¢
Stowell's Steel Rail, Plain.....25%
Stowell's Wrought Bracket, Plain....3½¢
Swett's Hylo, per ft. 11¢.....50&10%
Swett's P. L. B. Steel Rail, ₱ 100 ft. $3.00

Rakes—

Net Prices, Malleable Rakes:

	10	*12*	*14*	*16-tooth*
Shank	*$1.50*	*1.60*	*1.75*	*1.85*
Socket	*$1.65*	*1.80*	*1.95*	*2.10*

Steel, August 1, 1899, List...70c&5c&20%
Malleable.....70c&10@75c&5%
Lawn Rakes, Metal Head, per doz., 20 teeth.....$3.25@3.50
24 teeth.....$3.60@3.75
Fort Madison Red Head Lawn.....$3.25
Fort Madison Blue Head Lawn.....$3.00
Jackson Lawn, 29 and 30 teeth, ₱ doz $4.00
Kohler's:
Lawn Queen, 20-tooth, ₱ doz.....$3.45
Lawn Queen, 24-tooth, ₱ doz.....$3.60
Paragon, 20 tooth, ₱ doz.....$2.75
Paragon, 24-tooth, ₱ doz.....$3.00
Steel Garden, 14-tooth, ₱ doz.....$2.88
Malleable Garden, 14-tooth, ₱ doz..$2.00

Rasps, Horse—

Disston's.....75%
Heller Bros.....70&5@70&10&5%
McCaffrey's American Standard..... 60&10&5%
New Nicholson.....70&10%
See also *Files.*

Razors—

Borasic.....60 & 10%
Fox Razors, No. 42, ₱ doz. $30.00 } 40%
Fox Razors, No. 44, ₱ doz, $20.00 } dis
Fox Razors, No. 82, Platina, ₱ doz. $25.00 }
Red Devil.....60%
Silberstein:
Carbo Magnetic.....$18.00
Griffon, No. 65.....$15.00
Griffon, No. 00.....$12.00
All other Razors.....40%
Safety Razors.....40%

Safety Razors—

New Gem, in Tin Boxes.....₱ doz. $12.00
New Gem, Extra Blades.....₱ doz. $8.35
Gem Outfits (Razor, Strop, etc.)..... ₱ doz. $15.60
Complete Razor, extra Blade in Leather Case.....₱ doz. $27.00

Reels— Fishing—

Bishop's Independent Fish Reel Spooler, ₱ doz.....$30.00
Hendryx:
M 6, Q 6, A 6, B 6, M 9½ 4008, Silver Rubber Populo, Nickeled Populo, Aluminum, German Silver, Bronze, 3 04 N, 0 6 N, 4 N to 8 PN.....33⅓&5
6 RW, 102 P and RN, 202 P and PN.40%
G 9.....20%
24 N to 28 PN.....35&10&10%
124 N, 974 PN, 002904 PN, 1020 R and PRN, 202 PR and PRN.... 50&5%
2904 N.....40&10&5%
5009 P and N.....50%
2904 P.....50&10&5%
2904 PN.....60%
0922 N.....40&10%
02084 N.....45&12½&5%
Single Action Trout.....40&10%
986 P N, 802 and 802 N.....50&10%
Competitor, 304 and 304 PN..... 35%
0304 P and PN.....40&5%
Safety and Salmon.....30%

Registers—*List July 1, 1903.*

Black Jap }
White Jap }
Bronzed } 70@75 & 10%
Nickel Plated }
Electro Plated }

Registers, Cash—

Sun, No. 10, Metal Cabinet.....$30.00
Sun, No. 10, Wood Cabinet.....$25.00

Revolvers—

Single Action.....35@90c
Double Act n, except 44 cal..$1.40@1.60
Double Action, 44 caliber..$1.75@1.95
Automatic.....$2.25@3.50
Hammerless.....$3.75@4.10

Riddles, Hardware Grade

16 in., per doz.....$2.25@$2.50
17 in., per doz.....$2.50@$2.75
18 in., per doz.....$2.75@$3.00

Rings and Ringers—

Bull Rings—

	2	*2½*	*3 Inch.*
Steel	*$0.70*	*0.75*	*0.80 doz.*
Copper	*1.00*	*1.10*	*1.35 doz.*

Hog Rings and Ringers—

Hill's Rings....gro. boxes, $4.25@4.50
Hill's Ringers, Gray Iron, doz. 55@60c
Hill's Ringers, Mal. Iron, doz. 75@80c
Blair's Rings.....per gro. $5.00@5.25
Blair's Ringers...per doz. $0.60@ .65
Brown's Rings....per gro. $5.50@5.75
Brown's Ringers..per doz. $0.75@ .85

Rivets and Burrs—

Copper.....50c&10@50c&10c&10%
Iron or Steel:
Tinners'.....75@75c&10%
Miscellaneous.....75@75c&10%

Rollers—

Acme, Stowell's Anti-Friction.....50%
Barn Door, Sargent's list.....60%
Cronk's Stay.....66⅔&5%
Cronk's Brinkerhoff.....66⅔%
Lane's Stay.....33⅓&5%
Stowell's Barn Door Stay.....₱ doz. $1.25

Rope—

Manila, 7-16 in. diam. and larger, tarred or untarred.....lb. 11½@11¾c
Manila, Hay, Hide and Bale Ropes, Medium and Coarse.....lb. 11½@12 c
Sisal, 7-16 in. diam. and larger:
Mixed.....lb. 8¼@ 8½c
Pure.....lb. 9¼@ 9½c
Sisal, Hay, Hide and Bale Ropes, Medium and Coarse:
Mixed.....lb. 8¼@ 8½c
Pure.....lb. 9¼@ 9½c
Sisal, Tarred, Medium Lath Yarn:
Mixed.....lb. 7¾@ 8 c
Pure.....lb. 8½@ 8½c
Cotton Rope:
Best.....¼-in. and larger, lb. 16 c
Medium..¼-in. and larger, lb. 14 c
Com ....¼-in. and larger, lb. 10 c
Jute Rope:
Thread No. 1, ¼-in. and up, lb. 6½c
Thread No. 2, ¼-in. and up, lb. 6 c
Yarn, ¼-in. and up.... lb. 5½c
Old Colony Manila Transmission Rope, ₱ lb 17½¢

Wire Rope—

Galvanized.....40c&5%
Plain.....45c&5%

Ropes, Hammocks—

Covert Mfg. Co.:
Jute.....40&5%
Sisal.....30%
Covert Saddlery Works.....60&5%

Rules—

Boxwood.....60&10@60c&10c&5%
Ivory.....35c&10@35c&10c&5%
Chapin-Stephens Co.:
Boxwood.....60@60&10%
Ivory.....35@35&10&10%
Miscellaneous.....50@50&10&10%
Combination.....55@55&10%
Stationers'.....10&10&10%
Lufkin's Steel.....50&10%
Lufkin's Lumber.....60&10%
Stanley R. & L. Co.:
Boxwood.....60@60&10%
Ivory.....35@35&10&10%
Upson Nut Co.:
Boxwood.....60@60&10%
Ivory.....35&10@35&10&10%

Sash Locks—See *Locks, Sash*

Sash Weights—

See *Weights, Sash.*

Sausage Stuffers or Fillers

—See *Stuffers or Fillers, Sausage*

Saw Frames—See *Frames, Saw*

Saw Sets—See *Sets, Saw.*

Saw Tools—See *Tools, Saw.*

Saws—

Atkins:
Circular.....50%
Band.....50&10@60%
Cross Cuts.....35&5%
Mulay, Mill and Drag.....50%
One-Man Saw.....40%
Wood Saws.....40%
Hand, Compass, &c.....40%
Chapin-Stephens Co.:
Turning Saws and Frames....30@30&10%
Diamond Saw & Stamping Works:
Sterling Kitchen Saws.....30&10&5%
Disston's:
Circular, Solid and Inserted Tooth..50%
Band, 3 to 14 in wide.....6%
Band, 1/4 to 2¾.....70%
Crosscuts.....45%
Narrow Crosscuts.....50%
Mulay, Mill and Drag.....50%
Framed Woodsaws.....35%
Woodsaw Blades.....35%
Woodsaw Rods.....25%
Hand Saws, Nos. 12, 99, 9, 10, d100, D8, 120, 7½, 77, 8.....25%
Hand Saws, Nos. 7, 107, 107½, 3, 1, 0, 00, Combination.....30%
Compass, Keyhole, &c.....25%
Butcher Saws and Blades.....35%
C. E. Jennings & Co.'s.:
Back Saws.....25&10%
Butcher Saws.....30&10%
Compass and KeyHole Saws.35&5&10%
Framed Wood Saws.....30&10%
Hand Saws.....20&2½&10%
Wood Saw Blades.....30&10%
Millers Falls:
Butcher Saws.....15&10%
Star Saw Blades.....15&10%
Peace:
Circular and Mill.....50%
Cross Cuts, list Jan. 1, '99.....50%
Hand, Panel and Rip.....30%
Richardson:
Circular and Mill.....50%
Hand, &c.....30%
X Cuts, list Jan. 1, '99.....50%
Simonds':
Circular Saws.....50%
Crescent Ground Cross Cut Saws..35%
One-Man Cross Cuts.....40&10%
Gang Mill, Mulay and Drag Saws..50%
Band Saws.....50%
Back Saws.....25@25&7½%
Butcher Saws.....35@35&7½%
Hand Saws.....25@25&7½%
Hand Saws, Bay State Brand.....45%
Compass, Keyhole, &c .....25@25&7½%
Wood Saws.....35@35&7½%

Hack Saws—

Atkins' Hack Saw Blades A A A. ... 25%
Disston:
Concave Blades.....25%
Keystone.....40%
Hack Saw Frames.....30%
Fitchburg File Works, The Best.....25%
C. E. Jennings & Co.'s:
Hack Saw Frames, Nos. 175, 180.... 35&5&10%
Hack Saws, Nos. 175, 180, complete. 35&5&10%
Goodell's Hack Saw Blades.....40%
Griffin's Hack Saw Frames .. 35&5&10%
Griffin's Hack Saw Blades.....35&5&10%
Star Hack Saws and Blades.....15&10%
Sterling Hack Saw Blades.....35%
Sterling Hack Saw Frames.....30&10&5%

Scroll—

Barnes' No. 7, $15.....25%
Barnes' Scroll Saw Blades.....40%
Barnes' Velocipede Power Scroll Saw, without boring attachment, $18; with boring attachment, $20.....20%
Lester, complete, $15.00.....15&10%
Rogers, complete, $4.00.....15&10%

Scalers, Fish—

Bishop's Lightning.....₱ doz. $3.00
Covert's Saddlery Works.....60&10%

Scales—

Family, Turnbull's.....30@30&10%
Counter:
Hatch, Platform, ½ oz to 4 lbs. doz. $5.70
Two Platforms, ½ oz to 8 lbs. doz. $16
Union Platform, Plain...$1.70@1.90
Union Platform, Striped $1.85@2.15
Chatillon's:
Eureka.....25%
Favorite.....40%
Grocers' Trip Scales.....50%
Chicago Scale Co.:
The "Little Detective," 25 lbs.....50%
Union or Family No. 2.....60%
Portable Platform (reduced list).....50%
Wagon or Stock (reduced list)... 25@35%
Pelouze Scales—Household, Counter, Candy, Ice, Postal, Computing.....50%
"The Standard" Portables.....45%
"The Standard" R. R. and Wagon.....50%

Scrapers—

Box, 1 Handle.....doz. $2.25@2.50
Box, 2 Handle.....doz. $3.00@3.50
Ship Light, $2.50; Heavy, $3.00
Adjustable Box Scraper (S. R. & L. Co.) $6.00.....30@30&10%
Chapin-Stephens Co., Box.....50@50&10%

Screens, Window, and Frames—

Flyer Pattern Window Screen...60@60&5%
Maine Window Screen Frames ..60&10&5%
Perfection Window Screens.....60@60&5%
Phillips' Window Screen Frames....60&5%
Porter's:
Fairview Window Screens..... 60&5@60&5&2½%
Hummer Window Screens..... 60&5@60&5&2½%
Klondike Window Screens..... 60&5@60&5&2½%
See also *Doors.*

Screws—Bench and Hand—
Bench, Iron..doz. 1 in.. $2.75@3.00; 1¼, $3.25@3.50; 1¼, $3.85@4.25
Bench, Wood, Beech....doz. 30@ 0&5
Hand, Wood.....30@30&5%
R. Bliss Mfg. Co, Hand.....30%
Chapin-Stephens Co., Hand.....30@30&10%

Coach, Lag and Hand Rail—
Lag, Common Point, list Oct. 1, '99.....70&10@...%
Coach and Lag, Gimlet Point, list Oct. 1, '99.....70&10@...%
Hand Rail, list Jan. 1, '81.60&10@...%

Jack Screws—
Standard List.....75&10@80&5%
Millers Falls.....50&10&10%
Millers Falls, Roller.....50&10%
P. S. & W.....50@50&10%
Sargent.....70&10%

Machine—
List Jan. 1, '98.
Flat or Round Head, Iron.50@50&10%
Flat or Round Head, Brass50@50&10%

Set and Cap—
Set (Iron or Steel).....70%
Sq. Hd. Cap.....60%
Hex. Hd. Cap.....65%
Rd. or Fillister Hd. Cap.....50%

Wood—
List July 23, 1900.
Manufacturers' printed discounts:
Flat Head, Iron.....87½@20@...%
Round Head, Iron.....85&10@...%
Flat Head, Brass.....85&10@...%
Round Head, Brass.....80&10@...%
Flat Head, Bronze...77½@20@...%
Round Head, Bronze.....75&10@...%
Drive Screws.....87½&10...%

Scroll Saws—See *Saws, Scroll.*

Scythes—
Per doz.
Clipper Pattern, Grass...$4.50@$5.00
Full Polished Clipper.....$6.00@$7.50
Grain.....$7.00@$7.50
Clipper, Grain.....$7.75@$8.25
Weed and Bush.....$4.75@$5.00

Seeders—Raisin—
Enterprise.....25@30%

Sets—Awl and Tool—
Brad Awl and Tool Sets:
Wood Hdle., 10 Awls doz. $2.00@2.25
Wood Hdle., 14 Awls, 6 Tools doz. $2.50@2.60
Aiken's Sets, Awl and Tools:
No. 20, ₱ doz. $10.00.....50&10&10%
Fray's Adj. Tool H'dls....Nos. 1, $12; 2, $18; 3, $12; 4, $9; 5, $7.....50%
C. E. Jennings & Co.'s Model Tool Holders.....9%&10%
Millers Falls Adj. Tool H'dls, No. 1, $12; No. 4, $12; No. 5, $18.....15&10%
Stanley's Excelsior:
No. 1, $7.50; No. 2 $4.00; No. 3, $5.50.....30@30&10&10%

Garden Tool Sets—
Ft. Madison, Taree Pieces, Hoe, Rake and Shovel.....₱ doz. sets.....$9.00

Nail—
Square.....per gro. $2.25@2.50
Round, Blk. and Pol., assorted.....gro. $1.80@2.50
Octagon.....gro. $4.00@4.25
Knurled, Good.....gro. $5.75@6.00
Buck Brothers.....37½%
Cannon's Diamond Point, ₱ gr. $13..25%
Mayhew's.....per gro. $9.00
Snell's Corrugated, Cup Pt. per gro. $7.50
Snell's Knurled, Cup Pt....per gro $7.50

Rivet—
Regular list.....70&10@75%

Saw—
Aiken's:
Genuine.....50&10%
Imitation.....50&10%
Atkin's:
Criterion.....40%
Adjustable.....40%
Bemis & Call Co's.:
Cross Cut.....30%
Hammer, new Pat.....45%
Plate.....20%
Spring Hammer.....30%
Disston's Star and Monarch.....25%
Morrill's No. 1, $15.00.....50%
Nos. 3 and 4, Cross Cut, $20.83.....50%
No. 5, Mill, $30.00.....50%
Nos. 10, 11, 95, $15.83.....50%
No. 1 Old Style, $10.00.....50%
Special, $16.25.....50%
Giant Royal, Cross Cut.....₱ doz. $8.50
Royal, Hand.....₱ doz. $5.00
Taintor Positive, ₱ doz. $18.....60%

Shaving—
Fox Shaving Sets, No. 30, per doz, $24.00 net

Sharpeners, Knife—
Chicago Wheel & Mfg. Co.....65%
Smith & Hemenway Co.....70%

Shaves Spoke—
Iron.....doz. $1.00@1.15
Wood.....doz. $1.65@2.25
Bailey's (Stanley R. & L. Co.).....50@50&10&10%
Chapin-Stephens Co.....30@30&10&10%
Goodell's, ₱ doz. $9.00.....15&10%
Wood's F1 and F2.....50%

Shears—
	Cast Iron...	*7*	*8*	*9 in.*
	Best	*$16.00*	*18.00*	*20.00 gro.*
	Good	*$13.00*	*15.00*	*17.00 gro.*
	Cheap	*$5.00*	*6.00*	*7.00 gro.*

Straight Trimmers, &c.:
Best quality, Jap.....70@70&10%
" Nickel.....60@60&10%
Fair qual. Jap.....30@30&5%
" Nickel.....75@75&10%
Tailors' Shears.....40@40&10%
Acme Cast Shears.....30@40&5%
Geneva.....60%
Heinisch's Tailors' Shears.....40%
Wilkinson's Hedge.....1900 list 45%
Wilkinson's Pruning.....40%
Wilkinson's Sheep.....1900 list. 25%

Tinners' Snips—
Steel Blades.....20&5@20&10
Steel Laid Blades.....40&10@50%
Forged Handles, Steel Blades, Berlin.....40@40&10%
Heinisch's Snips.....40%
Jennings & Griffin Mfg. Co.'s, 6¼ to 10 inch.....40&7½&10%
Niagara Snips.....40%
P., S & W. Co.....20%

Pruning Shears and Tools—
Cronk's Grape Shears.....33⅓%
Cronk's Pruning Shears.....33⅓%
Disston's Combined Pruning Hook and Saw, ₱ doz. $18.00.....25%
Disston's Pruning Hook, ₱ doz. $12.00.....25%
John T. Henry Mfg. Co.:
Pruning Shears, all grades.....40@40&5%
Orange Shears.....50&10@50&20%
Grape.....40&10@50%
Tree Pruners.....75%
P., S. & W. Co.....33⅓%

Sheaves—Sliding Door—
Stowell's Anti-Friction.....50%
Patent Roller Hatfield's, Sargent's list, 70&10%
Reading.....10&10@75%
L. & E. list.....33⅓%
Wrightsville Hatfield Pattern.....80%

Sliding Shutter—
Reading list.....70&10@75%
R. & E. list.....33⅓%
Sargent's list.....50&10%

Shells—Shells, Empty—
Brass Shells, Empty:
Hard Cartridge, all gauges.....60&5%
Climax, Cup, Rival, 10 and 12 gauge..65&5%
Paper Shells, Empty:
Acme, Ideal, Leader, New Rapid, Magic, 10, 12, 16 and 20 gauge..25&5%
Blue Rival, New Climax, Challenge, Monarch, Defiance, New Victor, Repeater, Yellow Rival, 10, 12, 13 and 20 gauge.....20%
Climax, Union, League, New Rival 10 and 12 gauge.....25%
Climax, Union, League, New Rival, 14, 16 and 20 gauge ($7.50 list)..20%
Expert, Metal Lined and Pigeon, 10, 12, 16 and 20 gauge.....33⅓&5%
Robin Hood, Low Brass.....20&10%
Robin Hood, High Brass.....30&10%

Shells, Loaded—
Loaded with Black Powder.....40%
Loaded with Smokeless Powder, medium grade.....40&5%
Loaded with Smokeless Powder, high grade.....40&10&10%
Robin Hood, Low Brass.....50%
Robin Hood, High Brass.....50&10&5%

Shoes Horse, Mule, &c.—
F. o. b., Pittsburg:
Iron.....per keg $3.85
Steel.....per keg 3.60
Burden's, all sizes, ₱ keg.....$3.90

Shot—
Drop, up to B, 25-lb. bag.....$1.50
Drop, B and larger, per 25-lb. bag $1.75
Buck, 25-lb. bag.....$1.75
Chilled, 25-lb. bag.....$1.75
Dust Shot, 25-lb. bag.....$2.00

Shovels and Spades—
Association List, Nov. 15, 1902....40%

Sieves and Sifters—
Hunter's Imitation, gro. $11.00@11.50
Buffalo Metallic Blued, S. S. & Co., ₱ gr.:
14&16	16&18	18&20
$12.90	$13.80	$15.00

National Mfg. Co.:
Victor.....per gro. $12.00
Surprise.....per gro. $11.00
No Name.....per gro. $11 00
Shaker (Barler's Pat.) Flour Sifters, ₱ doz., $2.00.....90%

Sieves, Tin Rim—
Per dozen.
Mesh	*14*	*16*	*18*	*20*
Black, full size	*$1.20*	*1.25*	*1.30*	*1.35*
Plated, full size	*$1.30*	*1.35*	*1.40*	*1.45*
Black, scant		*$0.95*	*1.00*	*1.05*

Sieves, Wooden Rim—
Nested, 10, 11 and 12 Inch.
Mesh 18, Nested, doz.....$0.65@0.75
Mesh 20, Nested, doz.....75@ .85
Mesh 24, Nested, doz.....90@1.00

Sinks—Cast Iron—
Standard list.....60@60&10%
NOTE.—*There is not entire uniformity lists used by jobbers.*

Skeins, Wagon—
Cast Iron.....70@70&10%
Malleable Iron.....40&10@50%
Steel.....40@40&10%

Slates, School—
Factory Shipments.
"D" Slates.....45%
Noiseless Slates.....60&5 tens &5%
Wire Bound.....40%

Slaw Cutters—See *Cutters.*

Slicers, Vegetable—
Sterling No. 10, $2.00.....33⅓

Snaps, Harness—
German.....40@40&10%
Covert Mfg. Co.:
Derby.....30&5&2½
High Grade.....45%
Jockey.....30&10%
Trojan.....45%
Yankee.....30&5&2½
Yankee, Roller.....30&5&2½
Covert's Saddlery Works:
Crown.....60%
German.....60%
Model.....60%
Triumph.....60%
Oneida Community:
Solid Steel.....60&5%
Solid Swivel.....60%
Sargent's Patent Guarded.....66⅔&10%

Snaths—
Scythe.....45&5@50&12½%

Snips, Tinners'—See *Shears.*

Spoons and Forks—
Silver Plated—
Good Quality.....50&10@60&10&5%
Cheap.....60@60&10%
International Silver Co.
1847 Rogers Bros. and Rogers & Hamilton.....40&10%
Rogers & Bro., William Rogers Eagle Brand.....50&10%
Anchor, Rogers Brand.....60%
Wm. Rogers & Son.....60&10%
Simeon L. & Geo. H. Rogers Co.:
Silver Plated Flat Ware.....60%
No. 77 Silver Plated Ware.....60&10%

Miscellaneous—
German Silver.....60@60&10%
Cattaraugus Cutlery Co.:
Yukon Silver.....50%
Simeon L. & Geo. H. Rogers Co.:
German or Nickel Silver, Special list 10&10%

Tinned Iron—
Teas.....per gro. .75@.90
Tables.....per gro. .90@$1.00

Spr[illegible]gs—Door—
Gem (Coil).....20%
Star (Coil).....30%
Torrey's Rod, 30 in.....per doz. $1.10
Victor (Coil).....50&30&20%

Carriage, Wagon, &c.
1¼ in. and Wider:
Black or ¼ Bright, list.....½@[illegible]c
Bright, lb.....5¼@5½c
Painted Seat Spring:
1½ x 2 x 26 per pr.....50@55c
1½ x 2 x 28 per pr.....60@65c
1½ x 3 x 28 and narrower, per pr. 80@85c

Sprinklers, Lawn—
Enterprise.....25@30%
Mackney.....₱ doz. $1.00
Philadelphia No. 1, ₱ doz. $12; No. 2, $15; No. 3, $24.....30%

Squares—
Nickel plated.... } *List Jan. 5, 1900.*
Steel and Iron... } *70&10@70&10&10@10%*
Rosewood Hdl Try Square and T-Bevels.....60&10&10@70%
Iron Hdl. Try Squares and T-Bevels. 40&10@40&10&10@5%
Disston's Try Sq. and T-Bevels.....70%
Winterbottom's Try and Miter.....40&10@40&10&10%

Squeezers—Lemon—
Wood, Common, gro., No. 0, $5.25 @$5.50; No. 1, $6.25@$6.50.
Wood, Porcelain Lined, Cheap.....doz. $2.50@2.75
Good Grade.....doz. $3.00@3.50
Tinned Iron.....doz. $0.75@1.25
Iron, Porcelain Lined doz. $2.90@3.25

Staples—
Barbed Blind.....lb. 6@6½c
Electricians', Association list, 80&10&10&10%
Fence Staples, See Trade Report.
Galvanized, 15c less than Barb Wire
Polished, 20c less than Barb Wire
Poultry Netting, Staples....per lb. 3½@3¾c
Grand Crossing Tack Co.'s list....80&10%

Steels, Butchers'—
Dick's.....30%
Foster Bros'.....30%
C. & A. Hoffmann's.....40%

Steelyards.....25&10@30&10%

Stocks and Dies—
Blacksmiths'.....40&10@50%
Curtis Reversible Ratchet Die Stock..25%
Derby Screw Plates.....25%
Gardner Die Stocks No. 1.....50%
Gardner Die Stocks, larger sizes.....40%
Green River.....25%
Lightning Screw Plate.....25%
Little Giant.....25%
Reece's New Screw Plates.....25@30%

Stone—
Scythe Stones—
Chicago Wheel & Mfg. Co:
Gem Corundum, 10 inch, $3.00 per gro., 12 inch, $10.80
Pike Mfg. Co. 1901 list:
Black Diamond S. S.....₱ gro. $12.00
Lamoille S. S.....₱ gro. $11.00
White Mountain S. S.....₱ gro. $9.00
Green Mountain S. S.....₱ gro. $6.00
Extra Indian Pond S. S.....₱ gro. $7.50
No. 1 Indian Pond S. S.....₱ gro. $7.00
No. 2 Indian Pond S. S.....₱ gro. $4.50
Leader Red End S. S.....₱ gro $4.50
Balance of 1901 list 33⅓%

Oil Stones, &c.
Chicago Wheel & Mfg. Co., 1901 list:
Gem Corundum Oil, Double Grit.....50%
Gem Corundum Axe, Single or Double Grit.....55%
Gem Corundum Slips.....55%
Gem Corundum Razor Hones.....50%
Pike Mfg. Co. 1901 list: ₱ lb.
Arkansas Stone, No. 1, 3 to 5½ in. $2.80
Arkansas Stone, No. 1, 5½ to 8 in. $3.50
Arkansas Slips No. 1.....$4.00
Lily White Washita 4 to 8 in.....60¢
Rosy Red Washita 4 to 8 in.....60¢
Washita Stone, Extra, 4 to 8 in..50¢
Washita Stone, No. 1, 4 to 8 in..40¢
Washita Stone, No. 2, 4 to 8 in..30¢
Lily White Slips.....90¢
Rosy Red Slips.....90¢
Washita Slips, Extra.....80¢
Washita Slips, No. 1.....70¢
India Oil Stones (entire list).....33⅓%
Hindostan No. 1, Regular.....₱ lb.
Hindostan No. 1 Small.....₱ lb.
Axe Stones (all kinds).....
Turkey Oil Stones, ex. 5 to 8 in.....
Queer Creek Stones, 4 to 8 in.....
Queer Creek Slips.....
Sand Stone.....
Belgian, German and Swaty Razor Hones.....
Natural Grit Carving Knife Hones, ₱ doz.....
Quick Edge Pocket Knife Hones, ₱ doz.....
Mounted Kitchen Sand Stone, ₱ doz.....

Stoners—Cherry—
Enterprise.....25@30%

Stops, Bench—
Millers Falls.....15&10%
Morrill's...₱ doz., No. 1, $10.00.....30%
Morrill's, No. 2, $12.50.....30%

Door—
Chapin-Stephens Co.....60&60&10%

Plane—
Chapin-Stephens Co.....30%

Straps—Box—
Cary's Universal, case lots.....20@10%

Hame—
Covert's Saddlery Works.....60&10%

Stretchers, Carpet—
Cast Iron, Steel Points....doz. 55@60c
Socket.....doz. $1.75
Excelsior Stretcher and Tack Hammer Combined, per doz. $6.....30%

Stuffers, Sausage—
Enterprise Mfg. Co.....25@25&7½%
National Specialty Mfg. Co., list Jan. 1, '97.....30%

Supports, Porch—
Hoffman's Porch Supports....₱ doz. 25¢

Sweepers, Carpet—
National Sweeper Co.:	Per doz.
Marion, Roller Bearing, regular finishes, full Nickel	$24.00
Marion Queen, Roller Bearing, Fancy Veneers, full Nickel	$27.00
Monarch, Roller Bearing, Nickel	$22.00
Monarch, Roller Bearing, Japned	$21.00
Marion Queen, Roller Bearing, Regular Finisher, full Nickel	$24.00
Transparent, Roller Bearing, Plate Glass Top, Nickel	$32.00
Monarch Extra, Roller Bearing, (17-inch case), Nickel	$36.00
Monarch Extra, Roller Bearing (17-inch case), Japanned	$33.00
Perpetual, Regular Bearings, Nickel	$30.00
Perpetual, Regular Bearings, Japanned	$18.00

NOTE.—*Discount of 50c per dozen on three-dozen lots. Discount of $1 per dozen on five-dozen lots.*

Tacks, Brads, &c.—
List Jan. 15, '99.
Carpet Tacks, American.....
90@25&6@....%
American Cut Tacks..90@20&5@....%
Swedes Iron Tacks...90@30&5@....%
Swedes Upholsterers' Tacks.....
90@45&10&5@....%
Gimp Tacks.....90@45&5@....%
Lace Tacks.....90@40@....%
Trimmers' Tacks..90@30&10&5@....%
Looking Glass Tacks....70&10@....%
Bill Posters' and Railroad Tack....
90@45&5@....%
Hungarian Nails....80@20&5@....%
Common and Patent Brads....80&10%
Trunk and Clout Nails...80&5@....%
NOTE.—*The above prices are for Straight Weights.* An extra 5% is given Star Weights** and an extra 10&5% on Standard Weights.****

Miscellaneous—
Double Pointed Tacks...90 and 5 tens
Steel Wire Brads, R. & E. Mfg. Co.'s list.. 90&10@60%

See also *Nails, Wire.*

Tanks, Oil—
	Each.
Emerald, S. S. & Co.....30-gal	$3.40
Emerald, S. S. & Co.....60-gal.	$4.25
Queen City S. S. & Co., 30-gal	$3.65
Queen City S. S. & Co., 60-gal	$4.50

Tapes, Measuring—
American Asses' Skin.....50@10@5%
Patent Leather.....25@5@5%
Steel.....50@50@5%
Chesterman's.....25@25@5%
Keuffel & Esser Co., Steel and Metallic, Lower list, 1899.....33⅓%
Lufkin's Steel.....33⅓&35%
Lufkin's Metallic.....30@30&5%

Teeth, Harrow—
Steel Harrow Teeth, plain or headed, ⅝-inch and larger, per 100 lbs. $2.00

Thermometers—
Tin Case.....80@10@30@10&5%

Ties, Bale—Steel Wire.
Single Loop.....80@5%
Monitor, Cross Head, Etc.....70%

Tinners' Shears, &c.—
See *Shears, Tinners', &c.*

Tinware—
Stamped, Japanned and Planed, sold very generally at net prices.

Tips, Safety Pole—
Covert's Saddlery Works.....60&10%

Tire Benders, Upsetters, &c.—See *Benders and Upsetters, Tire.*

Tools—

Coopers'—
L. & I. J. White ..... 20@20&5%

Hay—
Myers' Hay Tools 50%

Saw—
Atkins' Cross Cut Saw Tools 40%
Simonds' Improved 33⅓%
Simonds' Crescent 25%

Ship—
L. & I. J. White 25%

Transom Lifters—
See Lifters, Transom.

Traps—

Fly—
Balloon, Globe or Acme ..... doz. $1.15@1.25; gro. $11.50@12.00
Harper, Champion or Paragon ..... doz. $1.25@1.50; gro. $13.00@13.50

Game—
Oneida Pattern ..... 80@80&5%
Newhouse ..... 45@45&5%
Hawley & Norton ..... 65&5@65&10%
Victor (Oneida Pattern) ..... 75@75&5%
Star (Blake Pattern) ..... 60@5&60&10%

Mouse and Rat—
Mouse, Wood, Choker, doz. holes ..... 8½@9c
Mouse, Round or Square Wire ..... doz. 85@90c
Marty French Rat and Mouse Traps (Genuine):
No. 1, Rat, Each $1.12½; ₱ doz. $12.00
No. 3, Rat, ₱ doz. $6.00; case of 50 $5.25 doz.
No. 3½, Rat, ₱ doz. $4.75; case of 72 $4.25 doz.
No. 4, Mouse, ₱ doz. $3.50; case of 7 $4.75 doz.
No. 5, Mouse, ₱ doz. $2.75; case of 150 $2.25
Schuyler's Rat Killer, No. 1, ₱ gr. $30.00
No. 2, ₱ gr. $30.00; Mouse, No. 3, $18.00 ..... 50%
J. M Mast Mfg. Co.: Per gro.
Mouse. Rat.
Blizzard ..... No. 12, $5.00 No. 1, $9 50
Old Nick ..... No. 30, 2.22 No. 2, 8.40
Joker ..... No. 5, 2.10 No. 3, 8.40
Imp'd Snap Shot, Mouse, per gro., 2 hole, $2.40.
Imp'd Snap Shot, Mouse, per gro., 4 hole, $4.20.

Trimmers Spoke—
Bonney's Nos. 1 and 2 ..... 33⅓%
Wood's E I 50%

Trowels—
Disston Brick and Pointing 30%
Disston Plastering 25%
Disston "Standard Brand" and Garden Trowels 35%
Kohler's Steel Garden Trowels, 5 in. ..... ₱ gro. $5.00
Kohler's Steel Garden Trowels, 6 in ..... ₱ gro. $6.00
Never-Break Steel Garden Trowels ..... gro. $6.00
Peace's Plastering 30%
Rose Brick and Plastering ..... 25&5%
Woodrough & McParlin, Pl'st'ring 25%

Trucks, Warehouse, &c.—
B. & L. Block Co.:
New York Pattern ..... 50&10%
Western Pattern ..... 60&10%
Handy Trucks ..... per doz. $16.00
Grocery ..... per doz. $15.00
Daisy Stove Trucks, Improved pattern ₱ doz. $18.50
Model Stove Trucks ..... ₱ doz. $18.50

Tubs, Wash—

	No. 1	2	3
Galvanized, per doz.	*$4.75*	*5.25*	*6.00*

Galvanized Wash Tubs (S. S. & Co.):

No.	1	2	3	10	20	30
Per doz.	$5 25	6.00	6.75	6.50	7.00	8.00

Twine—Miscellaneous—

Flax Twine—	*BC*	*B.*
No. 9, ¼ and ½-lb. Balls	*21½c*	*23½c*
No. 12, ¼ and ½ lb. balls	*17½c*	*19½c*
No. 18, ¼ and ½-lb. Balls	*15½c*	*17½c*
No. 24, ¼ and ½-lb. Balls	*15 c*	*17 c*
No. 36, ¼ and ½-lb. Balls	*14½c*	*16½c*

Chalk Line, Cotton, ½-lb Balls ..... 28@50c
Cotton Mops, 6, 9, 12 and 15 lb. to doz ..... 9@10c
Cotton Wrapping 5 Balls to lb ... according to quality ... 12½c@23c
American 2-Ply Hemp, ¼ and ½-lb. Balls ..... 13@14c
American 3 Ply Hemp, 1-lb. Balls ..... 13@14c
India 2-Ply Hemp, ¼ and ½-lb. Balls (Spring Twine) 8c
India 3-Ply Hemp, 1-lb. Balls 8c
India 3-Ply Hemp, 1¼-lb. Balls 7c
2, 3, 4 and 5-Ply Jute, ½-lb. Balls ..... 8@10c
Mason Line, Linen, ½-lb. Balls 45c
No. 261 Mattress, ¼ and ½-lb. Balls 37c
Wool, 3 to 6 ply ..... 5½@6c

Vises—

Solid Box ..... 50&10@50&10&5

Parallel—
Athol Machine Co:
Simpson's Adjustable 40%
Standard 40%
Amateur 25%
Bonney's 33⅓%
Columbian Hdw. Co 40%
Emmert Universal:
Pattern Makers' No. 1 ..... $15.00
Pattern Makers' No 2 ..... $12.50
Machinist and Tool Makers' No. 4 $12.50
Fisher & Norris Double Screw ..... 15&10%
Hollands':
Machinists' ..... 40@40&5%
Keystone ..... 65&5@70%
Lewis Tool Co ..... 20@30%
Merrill's 20%
Miller's Falls ..... 60&10%
Parker's:
Victor ..... 20@25%
Regulars ..... 20@25%
Vulcan's ..... 40@45%
Combination Pipe ..... 55@60%
Prentiss ..... 20@25%
Sargent's 40%
Smith & Hemenway Co.:
Machinists 40%
Jewelers 33⅓%
Snediker's X. L 33⅓%
Stephens' 33⅓%

Saw Filers'—
Bonney's, No. 1, $13; No. 3, $16 ..... 40%
Disston's D 3 Clamp and Guide, ₱ doz $30 ..... 25%
Reading 60%
Wentworth's Rubber Jaw, Nos. 1, 2 and 3 ..... 45&50%

Wood Workers'—
Wyman & Gordon's Quick Action, 6 in., $6.00; 9 in., $7.00; 14 in., $8.00.

Miscellaneous—
Bignall & Keeler Combination Pipe Vise 60%
Hollands' Combination Pipe ..... 60@60&5%
Parker's Combination Pipe:
87 Series 60%
187 Series ..... 60&5%
No. 870 ..... 40%

Wads—Price Per M.

B. E., 11 up	*60c*
B. E., 9 and 10	*70c*
B. E., 8	*80c*
B. E., 7	*80c*
P. E., 11 up	*$1.00*
P. E., 9 and 10	*1.25*
P. E., 8	*1.50*
P. E., 7	*1.50*
Ely's B. E., 11 and larger	*$1.70@1.75*
Ely's P. E., 12 to 20	*$3.00@3.20*

Dis. 15%

Ware Hollow—

Cast Iron, Hollow—
Stove Hollow Ware:
Ground ..... 50&10@60%
Unground ..... 60&5@65%
White Enameled Ware:
Maslin Kettles 70%
Covered Ware:
Tinned and Turned 40%
Enameled 50%
See also *Pots Glue.*

Enameled—
Agate Nickel Steel Ware ..... 50&20%
Agate Nickel Steel Ware, Specials ..... 60&15%
Iron Clad Ware ..... 70&10%
Lava, Enameled ..... 40&10%
Never Break Enameled 50%

Tea Kettles—
Galvanized Tea Kettles:

Inch	*6*	*7*	*8*	*9*
Each	*45c*	*50c*	*55c*	*65c*

Steel Hollow Ware.
Avery Spiders & Griddles ..... 65@65&5%
Avery Kettles 60%
Porcelained ..... 50&5&50&10%
Never Break Spiders and Griddles ..... 65&5%
Never Break Kettles 60%
Solid Steel Spiders & Griddles ..... 65&5%
Solid Steel Kettles 60%

Warmers, Foot—
Pike Mfg. Co., Soapstone ..... 40@40&10%

Washboards—
Solid Zinc ..... ₱ doz
Crescent, family size, bent frame. $3.00
Red Star, family size, stationary protector $3.00
Double Zinc Surface:
Saginaw Globe, family size, stationary protector $2.65
Cable Cross, family size, stationary protector $2.90
Single Zinc Surface:
Naiad, family size, open back perforated $2.40
Saginaw Globe, protector, family size, ventilated back $2.25
Brass Surface:
Brass King, Single Surface, open back $3.00
Nickel Plate Surface:
No. 1001 Nickel Plate, Single Surface $3.00

Washers—

Leather, Axle—
Solid ..... 80@10@80@10@10%
Patent ..... 90@90@65%
Coil: ⅜ 1 1¼ 1¼ Inch.
11c 12c 13c 14c per box

Iron or Steel—
Size bolt ..... 5-16 ¾ ½ ⅝ ¾
Washers $6.00 5.10 5.80 5.60 5.40
In lots less than one keg add ½c per lb., 5-lb. boxes add ½c to list.

Cast Washers—
Over ½ inch, barrel lots, per lb. ..... 1¾@2c

Waterers, Hog—
Improved Dewey, ₱ doz $13.00

Wedges—
Oil Finish ..... lb. 2.90@3.10c

Weights—

Hitching—
Covert's Saddlery Works ..... 60&10%

Sash—
Per ton, f.o.b. factory:
Eastern District $26.00
Western, Central and Southern Districts $27.00

Wheels, Well—
8-in., $1.6 @1.80; 10-in., $2.00@2.25; 12-in., $2.50@2.65; 15-in., $4.00@4.25

Wire and Wire Goods—
Bright and Annealed:
6 to 9 ..... 78½&5@72½&10%
10 to 18 ..... 72½&10@72½&10&5%
19 to 26 ..... 75&10@75&10@72½&5%
27 to 36 ..... 75&10@72½&10@72½&10&5%
Galvanized:
6 to 18 ..... 70@70&5%
19 to 26 ..... 72½&5@72½&10%
27 to 36 ..... 72½&10@72½&10&5%
Coppered:
6 to 9 ..... 70&5@70&10%
10 to 18 ..... 70&10@70&10&5%
19 to 26 ..... 75&7½@75&10&2½%
27 to 36 ..... 75&10@75&10&5%
Tinned:
6 to 14 ..... 75@75&7½%
15 to 18 ..... 72½&5@75%
19 to 26 ..... 70&5@70&5&5%
27 to 36 ..... 70@70&5%
Annealed Wire on Spools ... 70@70&5%
Brass and Copper Wire on Spools ... 60@60&5%
Brass, list Feb. 26, '96 ..... 30%
Copper, list Feb. 26, '96 ..... 15%
Cast Steel Wire 50%
Stubs' Steel Wire ..... $6.00 to $. 40%
Wire Clothes Line, see *Lines.*
Wire Picture Cord, see *Cord.*

Bright Wire Goods—
List June 24, 1903 ..... 90@90&10%

Wire Cloth and Netting—
Galvanized Wire Netting ... 80&10%
Painted Screen Cloth per 100 ft. $1.15
Standard Hardware Grade:
Nos. 2, 2½ and 3 Mesh, sq. ft 2c
Nos. 4 and 5 Mesh, sq. ft 3½c
No. 6 Mesh, sq ft 3½c
No. 8 Mesh, sq ft 4c

Wire Barb—See *Trade Report.*

Wrenches—
Agricultural ..... 80@80&10%
Baxter Pat'rn S Wrenches ..... 70&5@70&10%
Drop Forged S ..... 45@45&5%
Acme ..... 60&10%
Alligator 70%
Alligator Pattern 70%
Bull Dog 70%
Bemis & Call's:
Adjustable S ..... 35&5%
Adjustable S Pipe 40%
Brigg's Pattern ..... 30&10%
Combination Black ..... 40&5%
Combination Bright 40%
Merrick's Pattern 50%
No. 3 Pipe, Bright 55%
Boardman's 33⅓%
Coes' Genuine Knife Hdl ..... 40&10&5&5%
Coes' Genuine Steel Hdl ..... 40&10&5&5%
Coes' Genuine Key Model ..... 40&10&5&5%
Coes' "Mechanics' ..... 40&10&10&5&5%
Donohue's Engineer ..... 40&10%
Dudly Combination ..... 50&10&5%
Dudly Pipe ..... 50&10&5%
Dudly Adjustable Pipe ..... 40&10&5%
Eagle ..... 50&10%
Elgin Wrenches 40%
Elgin Monkey Wrench Pipe Jaws 33⅓%
Gem Pocket 30%
Hercules 70%
W. & B. Machinist:
Case lots ..... 50&10%
Less than case lots ..... 50&5%
Improved Pipe (W & B.) 60%
Solid Handles, P. S. & W ..... 50@50&5%
Stillson 65%
Triumph ..... 60&10%
Vulcan Chain 50%

Fruit Jar—
Triumph Fruit Can Wrenches, ₱ gro. $19.20
Syrup Cap Wrenches ..... ₱ gro. $8.00
T & B Fruit Jar Wrenches, ₱ gro $16.50
T & B Fruit Jar Holders, ₱ gro. $30.00
30%

Wrought Goods—
Staples, Hooks, &c., list March 17 '92 ..... 90@90&5%

Yokes Neck—
Covert Saddlery Works, Trimmed 70%
Covert Saddlery Works, Neck Yoke Centers 70%

Yokes, Ox, and Ox Bows—
Fort Madison's Farmers & Freighters' ..... list net

Zinc—
Sheet ..... lb 7 @7¼c

PAINTS, OILS AND COLORS.

White Lead, Zinc, &c.
Lead, English white, in Oil ..... 7¼@ 9¾
Lead, American White, in Oil:
Lots of 500 ℔ or over ..... @ 6¼
Lots less than 500 ℔ ..... @ 7¼
Lead, White, in oil, 25 ℔ tin pails, add to keg price ..... @ ⅛
Lead, White, in oil, 12½ ℔ tin pails, add to keg price ..... @ 1
Lead, White, in oil, 1 to 5 ℔ assorted tins, add to keg price ..... @ 1½
Lead, American, Terms: For lots 12 tons and over ¼¢ rebate; and 2% f. o. b. cash if paid in 15 days from date of invoice; for lots of 500 lbs. and over 2% for cash if paid in 15 days from date of invoice; for lots of less than 500 lbs. net.
Lead White, Dry in bbls ..... 5¼@ 6¼
Zinc, American, dry ..... ₱ ℔ 4½@ 4¾
Zinc, Paris, Red Seal, dry ..... @ 8½
Zinc, Paris, Green Seal, dry ..... @ 9¼
Zinc, Antwerp Red Seal, dry ..... @ 6¼
Zinc, Antwerp, Green seal, dry ..... @ 8½
Zinc, V. M. French, in Poppy Oil, Green Seal:
Lots of 1 ton and over ..... 12 @12¼
Lots of less than 1 ton ..... 12¼@12¾
Zinc, V. M. French, in Poppy Oil, Red Seal:
Lots of 1 ton and over ..... 10¾@11¼
Lots of less than 1 ton ..... 11@11½
Discounts.—V. M. French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1%; 25 bbls., 2%; 50 bbls., 3%.

Dry Colors.
Black, Carbon ..... ₱ ℔ 5 @10
Black, Drop, Amer ..... 4 @ 6
Black, Drop, Eng ..... 5 @15
Black, Ivory ..... 16 @20
Lamp, Coal ..... 4½@ 6
Blue, Celestial ..... ₱ ℔ 4 @ 6
Blue, Chinese ..... 29 @32
Blue, Prussian ..... 27 @30
Blue, Ultramarine ..... 4½@15
Brown, Spanish ..... ½@ 1
Carmine, No. 40 ..... ₱ ℔ $2.50@2.90
Green, Chrome, ordinary ..... 3½@ 6
Green, Chrome, pure ..... 17 @25
Lead, red, bbls. ½ bbls. and kegs:
Lots 500 ℔ or over ..... @ 6¼
Lots less than 500 ℔ ..... @ 7¼
Litharge, bbls. ½ bbls. and kegs:
Lots 500 ℔ or over ..... @ 6¼
Lots less than 500 ℔ ..... @ 7¼
Ocher, French Washed ..... 5 @ 7
Ocher, Dutch Washed ..... 5 @ 7
Ocher, American ..... ₱ ton $8.50@16.00
Orange Mineral, English ..... ₱ ℔ 8½@ 9½
Orange Mineral, French ..... 10½@11½
Orange Mineral, German ..... @ 10½
Orange Mineral, American ..... 8½@ 8½
Red, Indian, English ..... 4½@ 8½
Red, Indian, American ..... 3 @ 3½
Red, Turkey, English ..... 4 @ 6
Red, Tuscan, English ..... 7 @10
Red, Venetian, Amer., ₱ 100 ℔ .50@1.50
Red Venetian, English, ₱ 100 ℔ 1.25@1.75
Sienna, Italian, Burnt and Powdered ..... ₱ ℔ 3 @ 6½
Sienna, Ital., Raw, Powd ..... 3 @ 4½
Sienna, American, Raw ..... 1½@ 2
Sienna, American, Burnt and Powdered ..... ₱ ℔ 1½@ 2
Talc, French ..... ₱ ℔ 2 @ 2½
Talc, American ..... 1.10@1.50
Terra Alba, French, ₱ 100 ℔ .95 @1.00
Terra Alba, English ..... .95 @1.00
Terra Alba, American No. 1 ..... .65 @.85
Terra Alba, American No. 2 ..... .45 @.50
Umber, Turkey, Bnt. & Pow. ₱ ℔ 2½@ 3½
Umber, Turkey, Raw & Powd. 2½@ 3½
Umber, Bnt. Amer ..... 1½@ 2
Umber, Raw, Amer ..... 1½@ 2
Yellow, Chrome ..... 11 @14
Vermilion, American Lead ..... 10 @40
Vermilion, Quicksilver, bulk ..... @70
Vermilion, Quicksilver, bags ..... @71
Vermilion, English, Import ..... .80 @.85
Vermilion, Chinese ..... .80@1.00

Colors in Oil.
Black, Lampblack ..... 12 @14
Blue, Chinese ..... 36 @40
Blue, Prussia ..... 32 @36
Blue, Ultramarine ..... 14 @16
Brown, Vandyke ..... 11 @14
Green, Chrome ..... 10 @15
Green, Paris ..... @24
Sienna, Raw ..... 12 @15
Sienna, Burnt ..... 12 @15
Umber, Raw ..... 11 @14
Umber, Burnt ..... 11 @14

Miscellaneous.
Barytes, Foreign, ₱ ton ..... $18.00@20.00
Barytes, Amer. floated ..... 18.50@20.00
Barytes, Crude, No. 1 ..... 9.00@10.00
Chalk, in bulk ..... ₱ ton 3.25@ 3.50
Chalk, in bbls ..... ₱ 100 ℔ ..@ 35
China Clay, English ..... ₱ ton 11.00@17.00
Cobalt, Oxide ..... ₱ 100 ℔ 2.00@ 2.65
Whiting, Common ..... ₱ 100 ℔ .48@ .55
Whiting, Gilders ..... .62@ .68
Whiting, extra Gilders' ..... .66@ .72

Putty.
In bladders ..... 1¾@2¼
In bulk ..... 1½@2
In cans 1 ℔ to 5 ℔ ..... 2½@4¼
In cans 12½ ℔ to 25 ℔ ..... 1¾@2¼

Spirits Turpentine.
In Oil bbls ..... 59 @59½¢
In machine bbls ..... 59½@60 ¢

Glue.
Cabinet ..... ₱ ℔ 11½@16
Common Bone ..... 6½@ 8
Extra White ..... 18 @23
Foot Stock, White ..... 11½@ 13½
Foot Stock, Brown ..... 7½@10
German Hides ..... 12½@ 6
French ..... 12 @40
Irish ..... 13½@16
Low Grade ..... 9 @12
Medium White ..... 14½@16½

Animal, Fish and Vegetable Oils.
Linseed, City, raw ..... ₱ gal..37 @ 38
Linseed, City, boiled ..... 39 @40
Linseed, State and West'n, raw 35 @37
Linseed, raw Calcutta seed ..... 75 @ ..
Lard, Prime ..... 64 @65
Lard, Extra No. 1 ..... 52 @54
Lard, No. 2 ..... 43 @44
Cotton-seed, Crude, f.o.b mills. 27½@32
Cotton-seed, Summer Yellow, prime ..... 42 @42½
Cotton-seed Summer Yellow, off grades ..... 38 @38½
Sperm, Crude ..... @ ..
Sperm, Natural Spring ..... 65 @67
Sperm, Bleached Spring ..... 67 @68
Sperm, Natural Winter ..... 69 @70
Sperm, Bleached Winter ..... 71 @72
Tallow, Prime ..... 49 @50
Whale, Crude ..... @ ..
Whale, Natural Winter ..... 46 @47
Whale Bleached Winter ..... 48 @49
Menhaden, Brown Strained ..... 31 @32
Menhaden, Light Strained ..... 32 @33
Menhaden, Bleached Winter ..... 34 @35
Menhaden, Ex Bleached Winter 36 @37
Cocoanut, Ceylon ..... 5¾@6
Cocoanut, Cochin ..... 6@6¼
Cod, Domestic ..... 37 @38
Cod, Newfoundland ..... 41 @42
Red Elaine ..... 45 @46
Red Saponified ..... ₱ ℔ 4½@ 4¾
Olive, Italian, bbls ..... 52 @ 57
Neatsfoot, prime ..... 55 @ 56
Palm, prime, Lagos ..... ₱ ℔ 6 @

Mineral Oils.
Black, 20 gravity, 25@30 cold test ..... ₱ gal. 13 @14
Black, 29 gravity, 15 cold test. 14 @15
Black, Summer ..... 13 @14
Cylinder, light filtered ..... 20½@21½
Cylinder, dark filtered ..... 18½@19½
Paraffine, 903-907 gravity ..... 15 @15½
Paraffine, 903 gravity ..... 14 @14½
Paraffine, 883 gravity ..... 11½@12
Paraffine, red ..... 14 @15½
In small lots ½¢ advance.

CURRENT METAL PRICES.

SEPTEMBER 9, 1903.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from Store—

Refined Iron:	
1 to 1¼ in. round and square	@2.00¢
1½ to 4 in. x ⅜ to 1 in.	@2.00¢
1¼ to 4 in. x ¼ to 5-16	@2.20¢
Rods—⅜ and 11-16 round and square	@2.20¢
Angles:	Cts ₱ lb.
3 in x ¼ in. and larger	2.30¢
3 in. x 3-16 in and ⅛ in.	2.55¢
1¼ to 2½ in. x ⅛ in	2.35¢
1½ to 2¾ in. x 3-16 in and thicker	2.30¢
1 to 1¾ in. x 3-16 in	2.35¢
1 to 1¼ x ⅛ in.	2.40¢
⅞ x ⅛ in	2.55¢
¾ x ⅛ in	2.65¢
⅝ x ⅛ in	3.45¢
½ x 3-32 in	3.95¢
Tees:	
1 in.	2.80¢
1¼ in.	2.60¢
1½ in. and larger	2.50¢
Beams	2.50@3.00¢
Channels, 3 in. and larger	2.50@3.00¢
Bands—1½ to 6 x 3-16 to No. 8	₱ lb 2.40¢
"Burden's Best" Iron, base price	₱ lb 2.90¢
Burden's "H. B & S. Iron, base price	₱ lb 2.70¢
"Ulster"	₱ lb 3.15¢
Norway Bars	3.75@4.25¢
Norway Shapes	4.00@4.50¢

Merchant Steel from Store—

	per lb
Bessemer Machinery	2.10¢
Toe Calk, Tire and Sleigh Shoe	2.30@3.00¢
Best Cast Steel, base price in small lots	7¢

Soft Steel Sheets—

¼ inch	2.40¢	No. 14	2.70¢
3-16 inch	2.40¢	No. 16	2.80¢
No. 8	2.40¢	No. 18	3.00¢
No. 10	2.50¢	No. 20	3.00¢
No. 12	2.60¢	No. 22	3.10¢

Sheet Iron from Store.

Black.

	One Pass, C. R. Soft Steel	G. R. Cleaned.
Nos. 14 to 16	₱ lb 2.80	3.0 ¢
Nos. 18 to 21	₱ lb 2.90	3.10¢
Nos. 22 to 24	₱ lb 3.00	3.21¢
Nos. 25 and 26	₱ lb 3.10	3.30¢
No. 27	₱ lb 3.20	3.40¢
No. 28	₱ lb 3.30	3.50¢

Russia, Planished, &c.

Genuine Russia, according to assortment	₱ lb 11¾@14¢
Patent Planished	₱ lb A, 10¢; B, 9¢, net

Galvanized.

Nos. 14 to 16	₱ lb, 3.24¢
Nos. 18 to 20	₱ lb, 3.51¢
Nos. 22 to 24	₱ lb, 3.78¢
No. 26	₱ lb, 4.05¢
No. 27	₱ lb, 4.32¢
No. 28	₱ lb, 4.59¢
No 30	₱ lb, 5.67¢

No. 20 and lighter, 86 inches wide, 25¢ higher.

Foreign Steel from Store—

Best Cast	₱ lb 15 ¢
Extra Cast	₱ lb 18 @ 20 ¢
Swaged, Cast	₱ lb 16 ¢
Best Double Shear	₱ lb 15 ¢
Blister, 1st quality	₱ lb 13 ¢
German Steel, Best	₱ lb 10 ¢
2d quality	₱ lb 9 ¢
3d quality	₱ lb 8 ¢
Sheet Cast Steel, 1st quality	₱ lb 15 ¢
2d quality	₱ lb 14 ¢
3d quality	₱ lb 12 ¢
R. Mushet's "Special"	₱ lb 46 ¢
" " "Titanic"	₱ lb 19 ¢
Hobson's Choice XX Extra Best	₱ lb 35 ¢
Jessop Self Hardening	₱ lb 45 ¢
Seamans' "Nelson" Steel	40 ¢
Hobson's "Soho" Special Self-Hardening	₱ lb 43 ¢

METALS—

Tin—

Duty.—Pigs, Bars and Block. Free.	Per ₱
Banca, Pigs	28¼@29¼¢
Straits, Pigs	28¼@29¼¢
Straits in Bars	29¼@30 ¢

Tin Plates—

American Charcoal Plates.

Calland Grade:	
IC, 14 x 20	$6.75
IX, 14 x 20	8.25
Melyn Grade:	
IC, 14 x 20	6.50
IX, 14 x 20	7.75
Allaway Grade:	
IC, 14 x 20	5.50
IX, 14 x 20	6.60

American Coke Plates—Bessemer—

IC, 14 x 20 108 ₱	$4.60@4.70
IX, 14 x 20	$5.90@6.15

American Terne Plates—

IC, 20 x 28	$9.00
IX, 20 x 28	$11.00

Copper—

Duty: Pig, Bar and Ingot and Old Copper free. Manufactured, 2½¢ ₱ lb.

Ingot—

Lake	14¼@14¾¢
Casting	14@14¼¢

Sheet and Bolt—

March 12, 1903. Net.

Prices, in cents per pound. Sheet 30 x 60.

Not wider than	Not longer than	And longer than	64 oz. & over, 50 lb. sheet, 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lb.	24 oz. to 32 oz. 18¾ to 25 lb.	16 oz. to 24 oz. 12½ to 18¾ lb.	14 oz. and 15 oz. 11 to 12½ lb.	12 oz. and 13 oz. 9½ to 11 lb.	10 oz. and 11 oz. 7¾ to 9½ lb.	8 oz. and 9 oz. 6¼ to 7¾ lb.	Lighter than 8 oz.
Ins.	Ins.	Ins.									
30	72	.....	20	21	21	21	24	23	24	27	30
30	96	72	20	21	21	21	23	24	27	30	
30	.....	96	20	21	21	21	23	27			
36	72	.....	20	21	21	21	23	25	28	31	
36	96	72	20	21	21	21	23	27	30		
36	120	96	20	21	21	23	24				
36	.....	120	20	21	23	23					
48	72	.....	20	21	23	23	25	28	31		
48	96	72	20	21	23	24	26	29			
48	120	96	20	21	23	25	29				
48	.....	120	20	22	24	27					
60	72	.....	20	21	22	24	27	32			
60	96	72	20	21	23	25	30				
60	120	96	20	22	24	27					
60	.....	120	21	23	25	29					
72	96	.....	20	22	24	29					
72	120	96	20	23	26	31					
72	.....	120	21	24	29						
108	96	.....	21	24	27						
108	120	96	22	25	28						
108	...	120	23	26	30						
wider than 108	132	.....	24	27							
	.....	132	25	26							

Rolled Round Copper, ⅜ inch diameter and over, ₱ lb 20¢.

Circles, Segments and Pattern Sheets, 3¢ ₱ lb advance over price of sheet Copper required to cut them from.

Cold or Hard Rolled Copper 14 oz. ₱ square foot and heavier, 1¢ ₱ lb over the foregoing prices.

Cold or Hard Rolled Copper, lighter than 14 oz. ₱ square foot, 2¢ ₱ lb over the foregoing prices.

All Polished Copper, 20 in. wide and under, 1¢ ₱ lb advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 in. wide, 2¢ ₱ lb advance over the price for Cold Rolled Copper.

Planished Copper—

1¢ ₱ lb more than Polished Copper.

Copper Bottoms, Pits and Flats—

14 oz. to square foot and heavier, ₱ lb	35¢
12 oz. and up to 14 oz. to square foot, ₱ lb	36¢
10 oz. and up to 12 oz., ₱ lb	37¢
Lighter than 10 oz. ₱ lb	38¢

Circles less than 8 in. diameter, 2¢ ₱ lb additional

Circles over 13 in. diameter are not classed as Copper Bottoms.

Polished Copper Bottoms and Flats, 1¢ ₱ lb extra.

Copper Wire—

Hard and Soft Drawn—B. & S. Gauge.
List Feb. 25, 1901.

Nos.	0000 to 8 Base	9 and 10 ½¢		11 and 12 ¾¢ ₱ lb adv.
Nos.	13 ¾¢	14 ¾¢	15 1¢	16 1¼¢ ₱ lb adv.
Nos.	17 1¾¢	18 2¢	19 2¼¢	20 2½¢ ₱ lb adv

Seamless Brass Tubes—

Standard always Stubs' gauge, unless otherwise ordered.
Feb. 6, 1899. Net.

Stubs' W.G.	B. & S. W.G.	⅛	5-16	⅜	7-16	½	9-16	⅝	¾	⅞	1	1¼	1½
4-11	3- 9	...	.....	.....	.....	33	31	30	29	28	27	25	24
12	10	...	.....	37	35	33	31	30	29	28	27	25	24
13	11	...	.....	37	35	33	31	30	29	28	27	25	24
14	12	...	41	37	35	33	31	30	29	28	27	25	24
15	13	...	42	38	36	33	32	31	30	30	28	26	25
16	14	...	43	39	37	34	33	32	31	30	29	26	25
17	15	...	44	40	38	35	34	33	32	31	30	27	26
18	16	61	46	42	39	36	35	34	32	31	30	28	27
19	17	62	47	43	40	37	36	35	34	33	32	30	29
20	18–19	64	49	44	41	39	38	37	36	35	34	32	31
21	20	66	51	46	43	41	40	39	38	37	36	35	34
22	21	71	56	48	44	42	41	40	39	38	37	37	36
23	22	76	61	50	46	44	43	42	41	40	39	39	39
24	23	81	66	53	48	46	45	44	43	42	40	40	41
25	24	86	71	56	51	49	47	46	45	43	43	44	45

Copper Bronze and Gilding Tube, 3¢ ₱ lb additional

Iron Pipe Sizes—Brass

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6 inch
36	32	29	27	21	21	21	21	21	21	21	20	23	25	27	28¢ ₱ lb

Copper, Bronze or Gilding Tubes, 4¢ ₱ lb additional

Brazed Brass Tubing.

(*To No. 19, inclusive.*) June 6, 1898.
Brown & Sharpe's gauge standard.

	Per lb.
Plain Round Tube, ¼ in. up to 2 in.	$0.35
" " ⅜ " " ¾ "	.36
" " ½ " " ¾ "	.38
" " ⅝ " " ¾ "	.41
" " 5-16 " " ⅞ "	.48
" " ¾ " " 5-16 "	.65
" " 3-16 " " ¼ "	1.00
" " ⅛ " " 3-16 "	1.50
Smaller than ⅛ inch	Special
2 inch to 3 inch, to No. 19, inclusive	.54
3 inch	.40
Over 3 inch to 3½ inch, inclusive	.45
Over 3½ inch	.50

Bronze and Copper, advance on Brass List, 3 cents.
Discount from list 25%

Roll and Sheet Brass—

(*Brown & Sharpe Standard Gauge.*)

Common High Brass Wider than and including	in. 2 12	in. 12 14	in. 14 16	in. 16 18	in. 18 20	in. 20 22	in. 22 24	in. 24 26
To No. 20 inclusive	.22	.23	.25	.27	.29	.31	.33	.35
Nos. 21 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37
Nos. 25 and 26	.23	.24½	.27	.29	.31	.33	.35	.38
Nos. 27 and 28	.23	.25	.28	.30	.32	.34	.37	.39

Common High Brass Wider than and including	in. 26 28	in. 28 30	in. 30 32	in. 32 34	in. 34 36	in. 36 38	in. 38 40	in. 40
To No. 20, inclusive	.39	.42	.46	.50	.55	.60	.65	*
Nos. 21, 22, 23 and 24	.40	.43	.47	.51	.56	.61	.68	
Nos. 25 and 26	.41	.44	.48	.52	.57	.63	.71	
Nos. 27 and 28	.42	.45	.49	.53	.58	.65	.75	

* Special prices not less than 80 cents.

Add ¼¢ ₱ lb additional for each number thinner than Nos. 28 to 38 inclusive. Discount from List 25%

Wire in Coils.

List February 26, 1896.

Brown & Sharpe's gauge the standard.	Com. high brass.	Low brass.	Gilding bronze and copper
All Nos. to No. 10, inclusive	$0.23	$0.27	$0.28
Above No. 10 to No. 16	.23½	.27½	.28½
No. 17 and No. 18	.24	.28	.32
No. 19 and No. 20	.25	.29	.33
No. 21	.26	.30	.34
No 22	.27	.31	.35
No. 23	.28	.32	.36
No. 24	.30	.34	.38
No. 25	.32	.36	.40
No. 26	.35	.39	.43
No. 27	.38	.42	.46
No. 28	.42	.46	.51
No. 29	.45	.49	.54
No. 30	.48	.52	.62
No. 31	.51	.55	.67
No. 32	.55	.59	.73
No. 33	.59	.63	.82
No. 34	.64	.68	.95
No. 35	.70	.74	1.10
No. 36	.76	.80	1.50
No. 37	1.00	1.04	1.70
No. 38	1.30	1.34	2.00
No. 39	2.00	2.00	3.25
No. 40	2.60	2.60	5.75

Discount, Brass Wire, 25%; Copper Wire, NET.
List November 16, 98.
Spring Wire, 2¢ ₱ lb advance.

Tobin Bronze—

Straight, but not turned, Rods, ⅝ to 3 in. diameter, ₱ lb, net	19¢
Finished Piston Rods, ⅝ to 2½ in. diameter, ₱ lb net,	20¢

Other sizes and extreme lengths, special prices.

Spelter—

Duty: In Blocks or Pigs, 1¢ ₱ lb

Western Spelter	6¾@6¼¢

Zinc.

Duty: Sheet, 2¢ ₱ lb.

No. 9, base, casks	7¼¢	Open, per lb	8¢

Lead.

Duty: Pigs and Bars and Old, 2½¢ ₱ lb. Pipe and Sheets, 2½¢ ₱ lb.

American Pig	4.60@4.70¢
Bar	5@5¼¢
Pipe	₱ lb 4.90¢
Tin Lined Pipe	₱ lb 10¢
Block Tin Pipe	₱ lb 37½¢
Sheet Lead	₱ lb 6¢
Old Lead in exchange, 3½¢ ₱ lb	

Solder.

½ & ¼, guaranteed	18½@19¢
No. 1	16 @17 ¢

Prices of Solder indicated by private brand vary according to composition.

Antimony—

Duty, ¾¢ ₱ lb.

Cookson	₱ lb 7½@7¾¢
Hallett's	₱ lb 6¾@6¼¢

Aluminum—

Duty: Crude, 8¢ ₱ lb. Plates, Sheets, Bars and Rods, 15¢ ₱ lb.

No. 1 Aluminum (guaranteed over 99% pure), in ingot for remelting:	
Small lots	₱ lb 37¢
100-lb lots	₱ lb 35¢
No. 2 Aluminum (guaranteed to be over 90% pure), in ingots for remelting:	
Small lots	₱ lb 34¢
100-lb lots	₱ lb 33¢

Aluminum Sheet, B. & S. gauge. 50 lb or more

Wider than	6-in.	14-in.	24-in.	30-in.
And including	14-in.	24-in.	30-in.	
	₱ lb.	₱ lb.	₱ lb.	
Nos. 13 to 19	$0.42	$0.44	$0.47	
No. 20	.44	.46	.49	
Nos. 21 to 23	.46	.48	.51	
No. 24	.46	.50	.53	
No. 25	.47	.51	.54	
No. 26	.47	.54	.59	
No. 27	.48	.57	.62	
No. 28	.48	.57	.64	
No. 29	.49	.60	.69	
No. 30	.50	.64	.77	

Note.—Lots of less than 50 lb 5¢ ₱ lb extra.

Aluminum Wire, B. & S. Gauge.

Larger than No. 9	₱ lb 40¢	No. 15	₱ lb 43¢
No. 9 to No. 10	₱ lb 40½¢	No. 17	₱ lb 50¢
No. 11	₱ lb 41 ¢	No. 18	₱ lb 55¢
No. 12	₱ lb 41½¢	No. 19	₱ lb 60¢
No. 13	₱ lb 42 ¢	No. 20	₱ lb 65¢
No 14	₱ lb 42½¢	No. 21	₱ lb 85¢

Old Metals.

Dealers' Purchasing Prices Paid in New York.

Heavy Copper	₱ lb 11¼¢
Light and Tinned Copper	₱ lb 10¼¢
Heavy Brass	₱ lb 7¼¢
Light Brass	₱ lb 5¼¢
Lead	₱ lb 3½¢
Tea Lead	₱ lb 3½¢
Zinc	₱ lb 4¼¢
No. 1 Pewter	₱ lb 21¢
No. 2 Pewter	₱ lb 19¢
Pure Aluminum, Sheet, ₱ lb	16¢
Cast Aluminum, ₱ lb	10¢
Tin Plate scrap	₱ ton $15.50@16.00
Wrought Scrap Iron	₱ gross ton $14.00@14.50
Heavy Cast Scrap	₱ gross ton $13.50@14.00
Stove Plate Scrap	₱ gross ton $8.00@8.50
Burnt Iron	₱ gross ton $7.50@8.00